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ABSTRACT

The Third World Science Project (TWSP) is designed to add a multicultural element to existing science syllabi (for students aged 11-16) in the United Kingdom. The project seeks to develop an appreciation of the: boundless facination of the natural world; knowledge, skills, and expertise possessed by men/women everywhere; application of knowledge and skills to solve the practical problems of everyday life; impact of modern technology in the world; and the influence of the cultural background on the perception of knowledge, problems, and solutions. Provided are 18 science projects completed by students at the Lubushi Seminary (Northern Zambia) for use in TWSP units as well as to illustrate personal ideas about science in action. Projects include: chiteme (shifting cultivation); fishing in Lake Bangwelu; making Nshima (meal) from bananas; oil-making from castor seeds; Kanchine brewing; making a bark bag "ulupu"; making salt from mud and salt; Cibwa salt production; making fire by friction; bellows making; charcoal burning; iron smelting; constructing a mumamba (Bemba musical instrument); constructing a sekese (instrument to produce sound); drum making; constructing a model of a traditional African house; and a discussion of African medicine. A brief description of Lubushi Seminary, its science department, and science requirements is included. (JN)

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# THIRD WORLD SCIENCE

## pupils' projects from ZAMBIA

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# THIRD WORLD SCIENCE

A Collection of Third Form Science Projects
from Lubushi Seminary, Kasama, Zambia as
written and drawn by the pupils themselves.

Introduced by Philip Bladon

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Professor I.W. Williams.
April 1980

Second Printing - January 1983

# THIRD WORLD SCIENCE PROJECT

This project has been set up to collect examples of science in action in the Third World and to produce resource packs and information sheets for use by interested science teachers in Britain. There exist in developing countries numerous and often fascinating examples of science in action, which could serve as useful background information for illustrating points of theory in most science syllabuses. These examples are to be found in traditional craft practices, which are often highly skilled and sophisticated, in the appropriate use of modern technology, and in environmental features arising from unique geographical and climatic conditions. The information sheets will highlight their potential use as examples of science in action, but also enough information will be provided in the form of brief notes and further references to reveal their scope for project work. The use of such material has the possibility of enlivening a lesson and at the same time helping in a positive way towards creating an awareness of the different cultures and life styles that exist in the world and of the scientific and technological needs and potentials of developing countries. Considerable interest has been expressed in the project and examples have been submitted by science teachers in many developing countries as well as by teachers in Britain who have at one time taught overseas.

The project was established at Swansea in September, 1979 with the aid of a grant from Overseas Development Fund, but as from April, 1980, has been based at Bangor. Further details may be obtained from:

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School of Education,
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Gwynedd,
LL57 IDZ

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## LUBUSHI SEMINARY

A small mission secondary school situated in the heart of the African Bush, it lies approximately one hundred kilometres west of Kasama in Northern Zambia. This ideal site was chosen in 1930, when the Roman Catholic White Fathers were developing their network of mission stations in Bemba territory. Initially the first mission station at Lubushi was manned by three White Fathers, each clad in the same distinctive dress of an Arab gondoura, and wearing round their necks a large rosary of black and white beads. The fathers were accompanied by a lay-brother, who, with other brothers who followed him were responsible for the superbly constructed buildings of outstanding architecture at Lubushi. These fine buildings, literally in the middle of nowhere, were built entirely using local materials and resources. At an altitude of approximately one thousand five hundred metres above sea level, on the plateau, the area has a pleasant climate, and is served by an abundant water supply throughout the year from a 'nika', or'dambo', which is a treeless plain in a river valley that acts as a sponge during the rainy season.

October 1980, marks the Golden Jubilee of the founding of the seminary. It serves as a secondary school to train aspiring young Zambians to the priesthood. Pupils, after completing their form five Cambridge Overseas 'O' Level Certificcte Examination, leave to undergo their compulsory military training the national defence force. Those wishing to, may then go on to start the first part of their six year training for the priesthood at Mpima Seminary, near Kabwe.

Throughout its fifty year history the facilities of the school have grown. Water irrigation canals were dug in order that an extensive garden could be established. In addition to their normal school work, the seminarians are expected to contribute at least an hour's manual work every day, in order to help the seminary become self-sufficient in food. An agricultural production unit flourishes where maize is grown and livestock kept; students are trained and made responsible for the crops and animal husbandry. This is a small, but important contribution to the Zambian Agrarian Revolution, and above all, it provides the boarding department at the school with most of its food requirements of fruit and vegetables, eggs, and meat.

The sporting and recreational life of the students is well catered for. Over the years the efforts of both students and staff, often with a great deal of hard physical labour, have been rewarded. Large areas of bush were cleared to create football pitches an athletics track, basketball and volleyball courts, squash court, and a pitch and putt golf course have been added.

The head of the Science Department at the school for many years has been a Canadian White Father, Louis Vielfaure. He established a Science Laboratory in the school from virtually nothing, and has now collected a vast array of objects and materials which he uses in Science lessons. A Science reading room and museum allow students to study quietly by themselves during homework periods.

'Jets', the national young scientists' club, has branches in most schools, and encourages a lively interest in Science among pupils. Annual, regional and national Science fairs are held, where aspiring students compete for prizes and the President's Trophy - a distinguished award given to the best project on an aspect of village or rural development. Another area where secondary school students are required to pursue investigative work in General Science is in form three. The present requirement for a pass in General Science in the Junior Secondary School Leaving Examination is that candidates submit a project related in some way to Science. This project is assessed and moderated, and the mark awarded is then part of the final examination mark in the subject after the candidate has sat two written papers. It is a sample of these form three projects that follows. Many students refer to a book, 'Imilimo ya Bena Kale', by E. Kasonde; this is in fact a primary/secondary school text in Cibemba, the vernacular of the area, that deals with local traditional crafts.

I feel that this project material is really most fascinating, relating as it does to Science in the students' own context. Grateful thanks are accorded to the students whose work is presented here.

Philip Bladon
Volunteer Teacher, 1977 - 1979

LUBUSHI SEMINARY

— 100 km FROM

KASAMA.

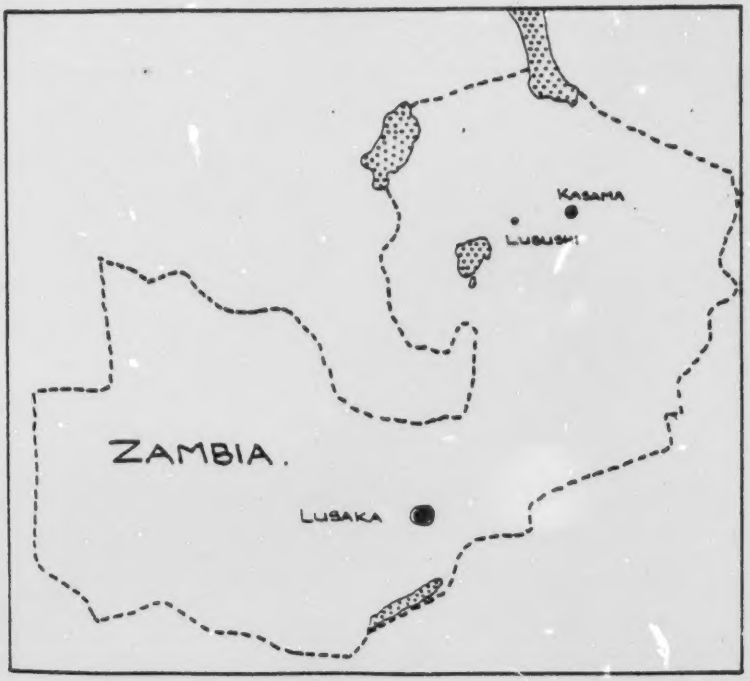
ZAMBIA.

MAP SHOWING THE SITUATION OF ZAMBIA IN AFRICA.

KEY:

ZAMBIA.

LAKES.




MAP SHOWING

LUSAKA - CAPITAL OF ZAM

KASAMA - NEAREST TOW

TO LUBUSHI SEM

Lubushi Seminary,
P.O. Box 294,
KASAMA,
Zambia,
Central Africa.

A Communication from Father Louis Vielfaure,
Head of Science Department,
Lubushi Seminary.

In 1975 the Ministry of Education in Zambia decided to include a project as part of the Form III final Science exam. This project would account for 15% of the total mark. As usual directives and suggestions came from Headquarters, in the Capital of Zambia, Lusaka. I do not want to be unkind to anyone, but I must confess that many suggestions given were very good for schools situated in urban areas, but most unpractical for rural schools. I remember one day receiving a circular making two suggestions for projects. One was to test the life span of different dry cells. First, we were told to go to all the different stores around our school and buy different kinds of cells. See if heat affected their life span by leaving them in a warm place, and also in a cool place, in a fridge. Lubushi is 100 km from the nearest store and 95% of the time no dry cells can be found. Another suggestion was to use cutex to make leaf prints. To find cutex, you would have to go to big towns of the Copperbelt, 400 km from here.

All this left me very frustrated. Whenever the students decided to do a project involving class physics or chemistry, I had to give them all they needed. Furthermore, their knowledge of physics and chemistry being very very limited at that stage, made it difficult for them really to make a personal project. Also one must remember that English is not their mother tongue. So I decided on a kind of compromise. From my experience of many years in Africa, I have always been impressed by the way people were putting scientific principles into practice without any formal knowledge of science. I encouraged my students to study things done by their ancestors and still being done and try to discover what scientific principle is involved in that particular operation e.g. iron smelting, beer brewing etc. I thought

that with this approach, most students would benefit more from such simple projects and learn quite a lot themselves about their own customs and traditions. These projects may appear simple and even somewhat primitive, but they are the work of the students themselves. My work has been, and is to encourage, direct etc., but NOT TO DO the work for them to save time. Neither do I agree to Form III students copying from a book, a few well chosen pages of explanation about a particular topic. I feel the project should be something personal involving the student in some sort of very simple research to get the facts and knowledge he is after. Not all students are born scientists and researchers. I believe we have to start with very simple things, simple projects, and the more gifted students will emerge naturally.

Briefly, that is the history of these projects. I was very surprised when I heard that Professor Iolo Williams wanted to use these projects to illustrate some personal ideas about science in action. Obviously I'm delighted if they can be of any help to him and the students he is preparing for a teaching career in Science.

Louis Vielfaure W.F.

SCIENCE PROJECTS FROM LUBUSHI SEMINARY ZAMBIA

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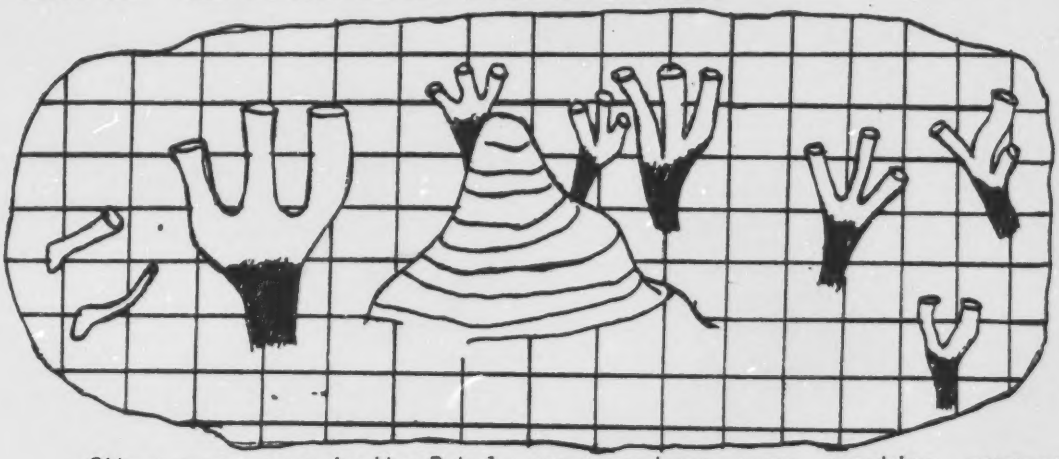
# CHITEMENE PROJECT

The word chitemene is a Bemba word which means a cut over area or an area cleared of trees for farming. This is shifting cultivation which is practised in the Northern Luapula, Southern and North-Western provinces of Zambia. Like all kinds of shifting agriculture, the chitemene system is a subsistence farming. In this case we are aiming at the one practised in the Northern province especially among the Bemba.

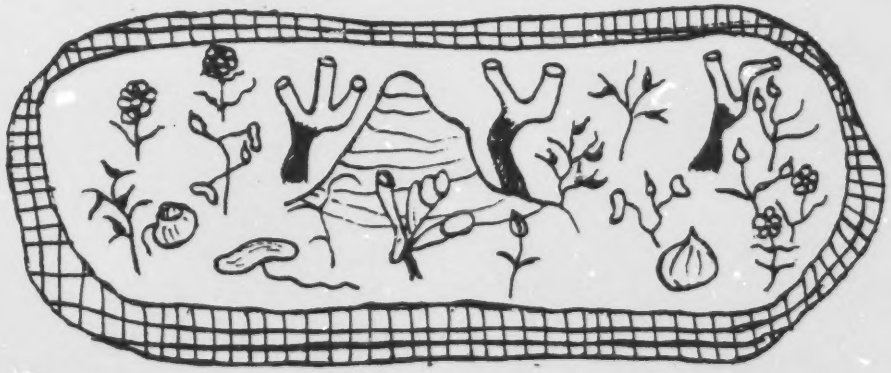
An area is chosen which will be good for cultivation, that is, an area of good soil without rocks, scattered trees because if they are close to one another, it would be difficult to cut them separately. When the area is chosen they make Ulukomo i.e. to cut a few trees, as a sign to show that an area that been chosen.

At the beginning of April to May onwards, the chopping of trees branches with axes starts, leaving the stunks standing. Small trees are cut about 50 cm to one metre above the ground. The cutting of trees is mainly done by men. They choose the centre which is usually around the anthill or a big tree. This central area is called Chisanshilo.

When the rain comes the first crop to be sown is cassava, as cassava is a vegetative reproductive crop,the stems are cut in pieces of ten to fifteen centimetres and buried in the soil. The second crop is maize which is sown around the anthills or half burnt standing trunks. After these crops have germinated the weeding starts in preparation of millet sowing which is the main crop of the chitemene system of agriculture. When sowing the millet grains are thrown along the passages left between the lines drawn called Indala. These lines are drawn to help those people who throw millet not to throw it in the same passage. Then the soil is spread over the millet to cover it. This is done in the middle of December.



Other crops sown in the Bukula are cucumbers, yams, pumpkins, cowpeas, melons and sugar cane. When the crops have grown a bit, a wooden fence is built around the Bukula. This is kind of protection against wild animals especially bush-pigs.



The harvesting of crops begins in April starting with maize. Millet is harvested in June and July after the heads have dried. This work is done by hand mainly by women using knives. Millet is stored in a millet-bin. It is used for local beer brewing, some of it for nshima as it is rich in proteins and it is also exchanged with fish from the Bisa people living around lakes.

The other remaining crops are eaten fresh. Some are left over for sowing the following years.

Crop rotation of the chitemene is the planting of different crops on the same ground. This is because if the same crop is planted every year in the same field, the soil quickly becomes infertile, because the crop always takes the same nutrients out of the ground. But different crops need different nutrients, therefore if the different kinds of crops are planted in a field each year, different minerals and nutrients will be taken from the soil and some will be put back each year. In this way the natural fertility of the soil and important nutrients it contains can be made to last longer. After the harvest of millet the field is cleared for the sowing of groundnuts. They are sown in shallow holes of about ten centimetres deep. The sowing starts in December and the harvesting starts from April to early May. Then groundnuts are dried on mats before being stored in the bin. At this time cassava is ready to be used for nshima mainly, and is preferred to millet nshima. After cassava bean is sown in the field and is harvested in April. Then the area is left for a period of about 25-30 years so that it regains its natural fertility.

Advantages of the Chitemene

1. It is well adapted i.e. it grows well although the soil is not very fertile and does not need modern fertilizers.
2. It is a cheap method of agriculture because its farmer does not need to spend large amounts of money on equipment, fertilizer and other chemicals before he starts to cultivate.
3. It works in areas where communications are bad because there isn't good transport to take away the products.
4. The burning of trees provides the soil with a kind of fertilizer in the form of ash.
5. The burning of trees before cultivation helps to kill harmful insects and plant diseases which can damage them.

Disadvantages of the Chitemene

1. It is not an efficient system of agriculture because it produces only enough food for the farmer and his family and does not have a surplus which can be sold to other people like those in urban areas. This means that the farmer cannot get enough money to improve his farming methods.

2. The chitemene system is wasteful in its use of land areas which have been abandoned often as it cannot be used for many years because the soil is exhausted and is left open to erosion by rain and wind. These treeless areas can be seen in many parts of Zambia. They are a worry to the Government because there are not enough trees left for timber and also cause people to move from one place to another in search of trees.
3. If the burning of areas which are cleared for cultivation is not carefully controlled, other areas of natural vegetation can be burnt also.
4. Although the burning of trees in the chitemene provides a kind of fertilizer in the form of ash for the soil, many valuable nutrients which should go into the soil are lost during the burning.
5. This system of agriculture is causing the young population of Zambia to emigrate from rural areas to urban areas because of the bad methods.

Conclusion to Chitemene

The disadvantages of the chitemene are greater than the advantages. In order to develop rural areas and their agriculture in Zambia, the chitemene system must be replaced by modern methods of permanent commercial farming. In some parts of Zambia for example in mpika area it has started. But in many areas the chitemene system remains the only possible methods of farming until transport of goods is developed so as to allow farmers to sell their products even to urban areas. The Government is trying to solve this problem by setting up farm institutes and colleges (e.g. Mugwe Farm Institute near Kasama) which will teach peole modern farming methods. Also by preventing the cutting of trees in certain reserved areas like water sheds and along roads.

Bibliography

From Secondary Geography of Zambia by M.R. Naidoo and M. Mumbwe, Imilimo ya Benakale by E. Kasonde and from people in the villages.

by: Angel M. Nsaluyata, Chongo C. Stanley, ADeian S. Mwiba and Chanda B. Stephens.

# FISHING IN LAKE BANGWEULU

About fishing: from January to July

People don't catch many fish in Lake Bangweulu because from January to March there is a great increase of water due to rain.

In August to November small fish are caught in shallow water where food and oxygen are available. In December when the rain starts, big fish such as Tiger Fish (Insanga), Bull dog (Mambele, Ndomodomo), Bottle nose (Ndukusi), Green-headed bream (Nkamba), Yellow-belly bream (Nsuku), and others lay their eggs in shallow water. They come in great numbers. When they reach the shallow water the female are the first to go in a gulue and they start to lay their eggs in shallow water, where their eggs can be safe. After the female had laid their eggs the males came to produce sperm onto the eggs. After external ferilisation when the eggs are fertilised they are attached to the grass. After two or three days when the sun shines and the shallow water becomes very hot plus the rays of the sun it helps the eggs to break.

The outer part breaks off from the yolk and small fish comes out of it and it is left attached to the yolk through a small layer of the yolk skin which helps to feed off-spring until the mouth and gills appear. Small fish are caught in small nets which we call in our language (Utusanda). These nets we call in English Gill nets. There are other medium sized fish caught in out nets which we call (Musakila) these nets are used for catching big fish like breams. Gill nets are nets which catch fish by their gills. The nets usually made of strong nylon are attached to a rope with floats at the top (head rope) and a rope with sinkers at the bottom (the foot rope). Gill nets can be placed on the surface of or on the bottom, and can be fixed in one position or allowed to drift (move), along in the water. They are usually put out in evening and morning. Example of a gill net fish area, is Lake Bangweulu and gill nets are used to catch (Imanse), type white in colour like tiger fish. There is another net which we call (kachala). These nets are also catching a big fish like in the gill nets. But they do not put anything at the foot of the net. We put some corks only along the headrope to let the net floats. The nets are made of nylon, and are white when bought in the store. They are changed to brown or green by boiling with the right tree bark. Because if you use a wrong tree you may spoil your net. We use this net mainly during daytime. During night time is dangerous as animals may eat the net and it will put you in trouble and to spend a lot of time on mending.

There is another net which we call seine nets (draw nets) (umukuwau). These are nets which are pulled through the water towards the shore to trap the fish like gill nets, they are made of nylon and attached to a head rope with floats and a foot rope with sinkers. This method of fishing cannot be used where there are reeds, grasses or tree stumps in the water. Because these might damage the net. In some parts of Zambia the Government is trying to prevent seine net fishing because it can catch as many as possible and leave none to continue breeding. An example of seine net area in Zambia around Chilubi Island, Lake Bangweulu, to the Luapula province in Lake Bangweulu, and Mpullungu.

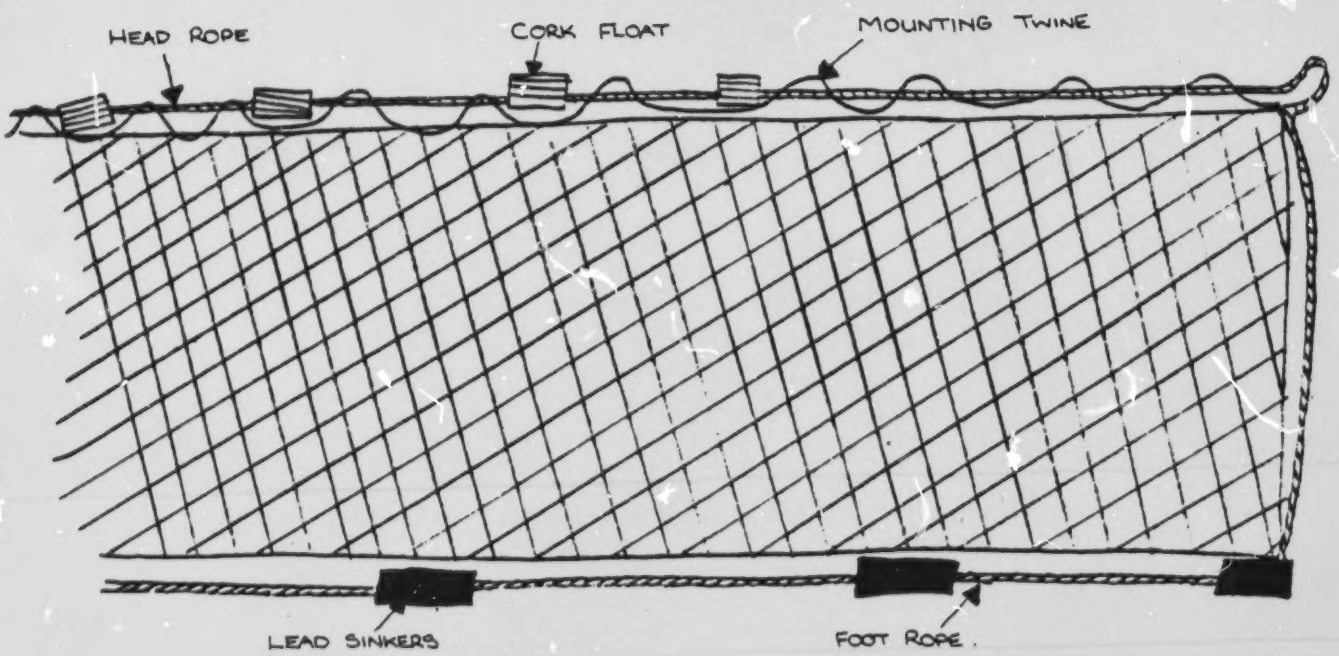
Problems facing commercial fishermen, the main commercial fishing area of Zambia e.g: Lake Langanyika, Lake Mweru, Lake Kariba are far from the main centres of population, the copper belt and Lusaka. This means that transport is very difficult from lakes or swamps to towns. Many of the roads in the commercial fishing areas are not good, especially in the rain season. This makes transport slow and much of the fish become rotten before it reaches the markets.

Most people in Zambia prefer fresh fish. This is a problem for the commercial fishermen, because ice is expensive to make and cold storage rooms are expensive to build. It would be easier for the fishermen if they could sell more processed dried salted and smoked fish in some fishing areas especially lying Lake Bangweulu there is a serious danger that the stock of supplies of fish will soon be exhausted, unless controls are introduced on the kind of nets fishermen can use.

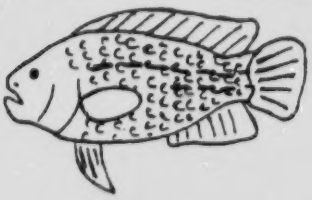
Information

We got the information from different people when we went home we tried to ask some of our friends, and our fathers how to catch fish by nets and how to use some of our friend and our fathers their names Mr Muyab Beston, father of Muyabi, Mr Venancees Banafenca, friend of Meeyabi John, Mr Atasio Chapewa, father of Modestu Cholpewa, Mr Polly Carpo Sqwe, friend of Maquinos Kanja, Mr Kunja Smith, father of Maquinos, Mr John Mapillanga, friend of Chapew Modestus.

We got some information from our grandfathers and part of it we did for ourselves by giving ideas by Protasio Chapewa, Muyab, John, Maquinos Kanja and Bonigace Chate, Seferino Mubanga.

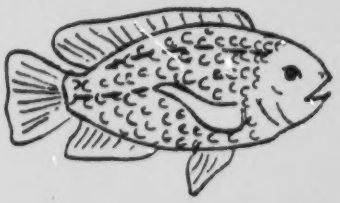



SOME KINDS OF FISH AND THEIR NAMES.

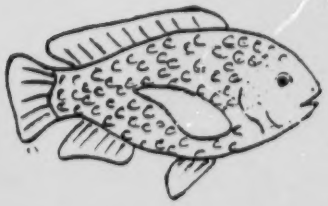


YELLOW - BELLY BREAM
(INSUKU.)

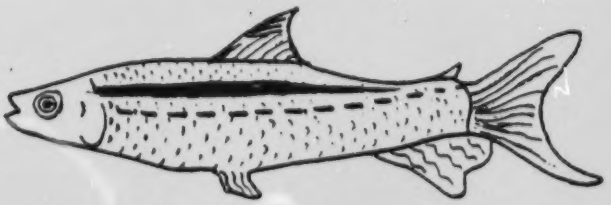
BOTTLE NOSE.
(NDIKUSHI, MBUBUBU.)



BROWNISH - HEADED BREAM
(IMPENDE)



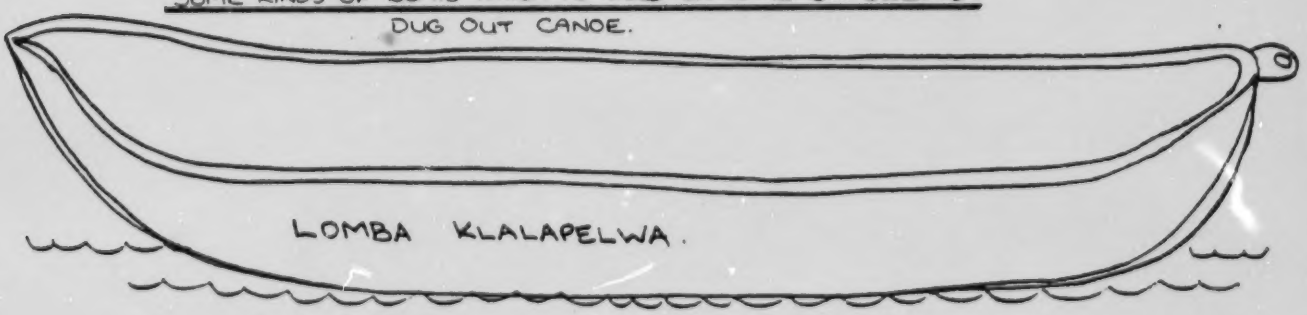
GREEN-HEADED BREAM
(ALE, INCAMBA)



TIGER FISH.
(MANDA, INSANGA, MUPENZI, NSENE)

SOME KINDS OF BOATS WHICH IS USED ON LAKE BANGWEULU.

DUG OUT CANOE.



LOMBA KLALAPELWA.

## MAKING NSHIMA OF BANANAS by Francis Mubanga

Aim - To make Nshima out of Bananas
Reason why this was done - Famine
Where this happened - In Lubemba Area - Zambia

A long time ago, when there was famine in Lubemba area, people thought of different ways of which they could obtain food more especially Nshima. Before discovering the use of bananas, they ate roots, fruits from wild trees, e.g: Mipundu, Misuku etc. They didn't know that bananas could be used for making proper food like Nshima. Men and women experimented many things like roots, ground nuts and some leaves for making Nshima, but these didn't work. At last they found bananas to be the best material which could be useful.

In the first experiments, they used all kinds of bananas, but it was later discovered that the best were those which were ready to ripen - because theycontained less acidic juice.

They had several ways of preparing their Nshima, but there were only two main ones used which I will write about.

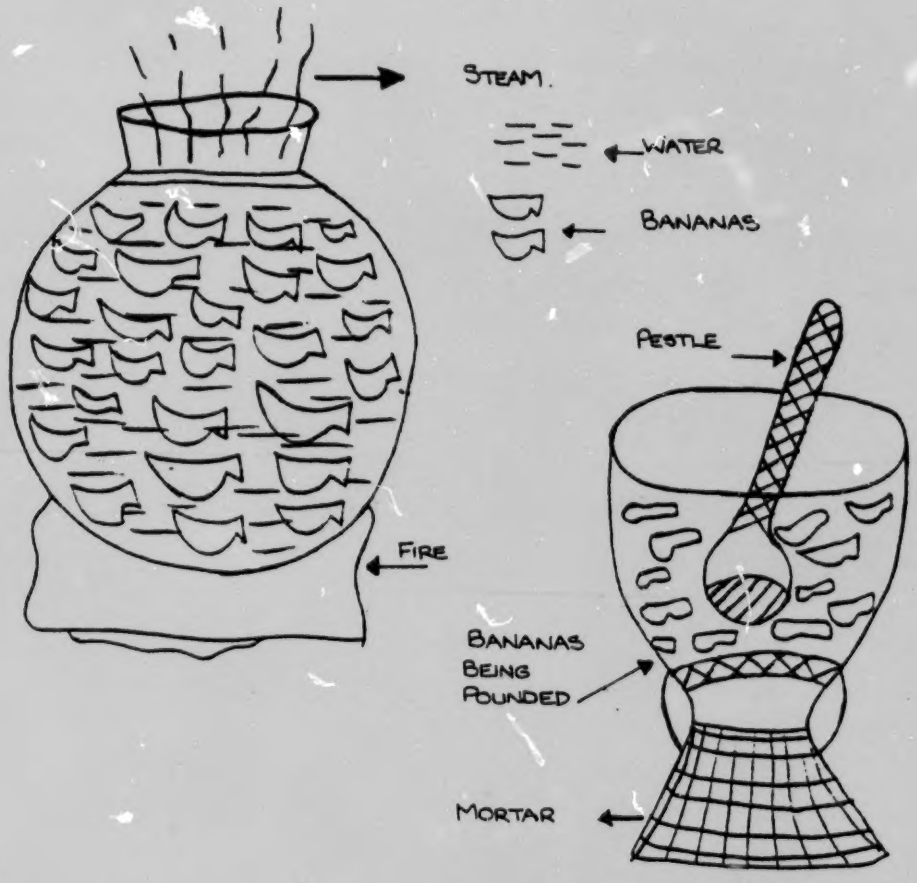
Method A

The bananas which were ready for ripening were cut and left for one night in their houses, to let the acidic liquid to go out through the cutting. The day after the bananas were cooked in clay pots, which were big enough. They had to use big pots if they were cooking many bananas. If they used a small pot and bananas were too packed then they would burst (bananas) and water could enter them making them bad. So the bananas were to be arranged well.

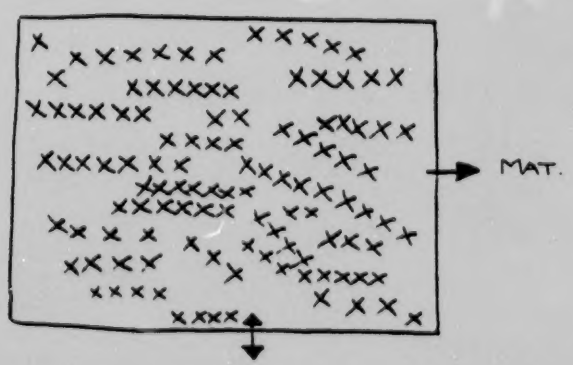
They arranged and cooked their bananas as shown by the diagram on the next page. They removed the bananas from the fire and allowed them to cool in the pot. The removing of the banana peels took place on the evening when there was not much work.

In the morning the bananas were spread in the sun to dry, mats were used for drying the bananas (is where bananas were spread). When evening came and banana were not yet dry, they had to put them together in the same container because the bananas would ferment and become useless for nshima making. When the bananas are fermented, they are used for beer brewing. During the process of fermentation the bananas turn into alcohol. So the bananas for nshima making were not to be fermented. If it was during the

dry season the bananas were just left where they were. To let the bananas dry more quickly, they had to pound them before drying to break them in small pieces as shown by the diagram.



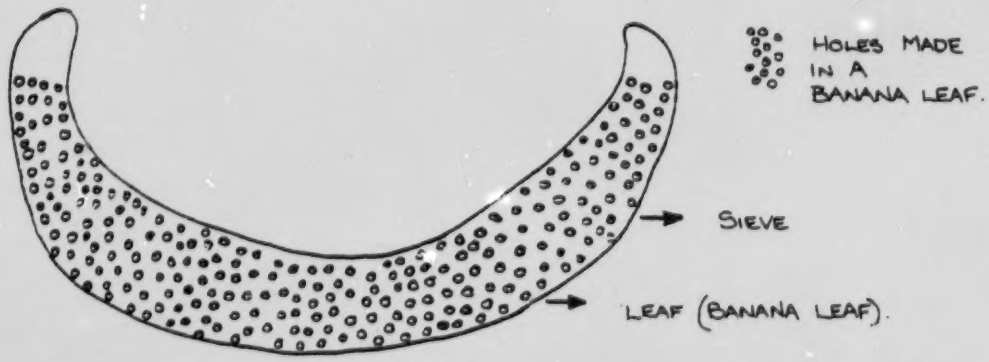

After pounding, the bananas were left in the sun to dry. After this, bananas were then taken home. Bananas were dried on mats like this.




BANANAS BEING DRIED ON A MAT IN THE SUN.

This process of drying bananas could last three days if there is not much heat e.g: in June. If it is more than three days, bananas will start stinking for they have fermented. When bananas have fermented, not much acid is left. In unripe bananas, there is plenty of acid which prevents the bananas from rotting, in these types of bananas there is un-cooked starch. But in cooked bananas, the starch(un-cooked starch) is converted into cooked starch thus turning it into alcohol. In bananas which have just fermented but not cooked, there is an acidic juice which can be tested by using a blue litmus paper which will turn red to indicate the presence of acid. But if we take a blue or red litmus paper and place it on a cooked banana, there can't be any change.

When bananas were dry, they were pounded in a mortar once more, to convert them into powder which would then be called mealie meal after sieving. To separate the bigger particles from the mealie meal, they were using sieves made of banana leaf. They used this sort of sieve because they had no modern sieves. The sieves were made like the one drawn below




The holes (small) were made in a banana leaf where the mealie meal was falling down through.

Before sieving, people were to make sure that their bananas were very dry, otherwise the mealie meal would be sticking to the sieve. Banana mealie meal has a pleasant smell which attracts insects such as cockroaches and others which stay in bamboo roots. These cockroaches feed on the mealie meal and drop their faeces in the mealie meal which cause stomach ache. To prevent all these, the mealie meal containers had to be covered very nicely.

How the Nshima was prepared

There are two main way which were used and which I will write about:-

Method 1

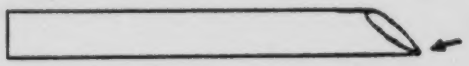
Water was first boiled, then mealie meal was mixed with cold water and then poured into boiling water thus turning into porridge like substance. After several minutes, the substance was turning yellowish to indicate that more mealie meal had to be added to the boiling substance in order to turn it into Nshima. This was done exactly like what they do with maize mealie meal nowadays.

Method 2

The second method was, boiling water to boiling point, then adding mealie meal without first making a porridge like substance. More and more mealie meal was added to make the nshima hard enough for a man to eat. This also, is like what they do with Millet mealie nowadays.

Method A: The second method for preparing bananas for Nshima is:

When they found out that the first method needed plenty of work, they thought of a way of doing it which they thought was a little easier. And this method was without cooking first. This was done as follows: The same bananas as in Method A were cut, left for one night as in Method A. The removing of the peels was done by small boys girls and women. They used small sticks sharpened at one end, which was used for dipping in a banana, making a cutting in the peel and then removing the peel as if the banana is ripe. This was made like the one drawn below:



SHARPENED AND USED TO REMOVE PEELS.

They used this kind of instrument because they had no knives and didn't know how to make them. This took them a long time to finish if they had many bananas.

After the bananas had been washed, they were put in a mortar for pounding. After drying, they were finally pounded and sieved by the sieve of a banana leaf like Method A. All the rest was done like in Method A.

The other method which they tried but is not very important, was fermenting (allowing the bananas to ripen) the bananas and all the rest was done like in A and B. But this method didn't work. This method could only work for beer

brewing. When the bananas have fermented, the bacteria or single celled fungi, called yeast, act on the sugars and starch of a benana, which reduces it by enzyme action to alcohol.

Conclusion: This method was easy compared to that of millet and maize. This method didn't need cutting of grass nor trees. Bananas were not to be replanted every year, for vegetative reproduction. Not much time was used for harvesting, like the maize and millet.

Bad things: There was a danger of fermentaion without adding water as for maize and millet. Nshima of bananas was not rich in mineral salts and body building properties as maize. Sometimes bananas were not available and therefore there was a danger of famine.

Guidance from: Father, mother, grandmother, uncle and grandfather

By - Francis Hubanga

# OIL MAKING FROM CASTOR SEEDS

## Aim

We want to obtain oil, to see it, colour, thickness and how much fat it contains.

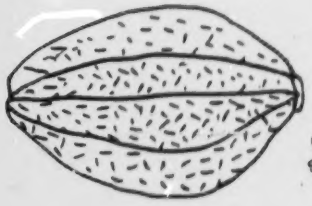
## Introduction

Seeds are planted when they are planting groundnuts in early November. They last for at least 8 months for ripening time. When they are ripe the buds burst, showing the cases where the seeds are. The tree grows to a height of 3 metres (the tallest).

During the growing season (period) it is green in colour when the seeds are ripening they turn to a brown colour, and the leaves turn yellow as if withering.

There are two types of castor seeds; but they grow to the same height. The smaller ones called "Utuselelele" don't give out enough oil. The bigger ones called "Imono" give out a lot of oil. For both the extraction of oil is the same.

Usually seeds replant themsleves, that is: seeds which were dropped when collecting from the previous year do come into existence on their own.



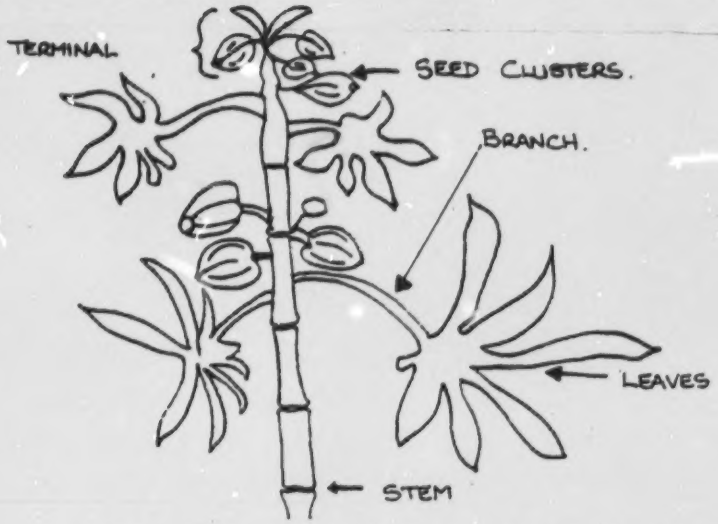
UNBURSTED SEED BUD.

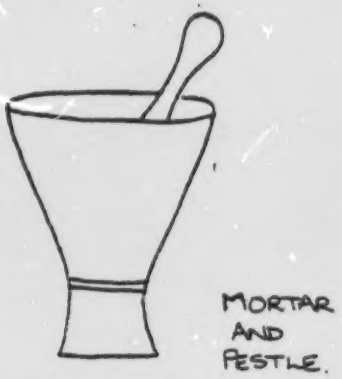
BURSTED SEED BUD.

## Obtaining Oil

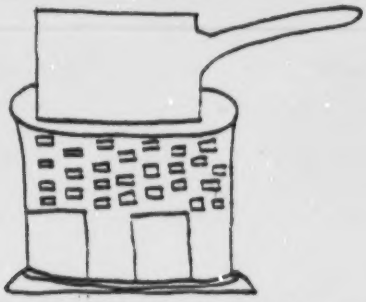
Materials needed: Castor seeds, a pan, a mortar and a pestle, water and a container to put in oil.

First the castor seeds are put in the sun to dry as they do to groundnuts. Then they are fried on a pan as they do to groundnut nuts. When cool they are put in a mortar to be pounded. It is pounded to butter.




After it is pound, it is put in a pot with water. It is then put on fire to let it boil till its boiling point. Meanwhile we have to stir it, so as not to let it stick to the bottom of the pot.



Now we have to wait until all the water has evaporated, we then see the oil in a sort of bubbles. The oil is on top and water then the waste matters (amabiya) at the bottom. To take the oil we have to pour the oil, then when it is cool, water is added in. Now the remaining oil is removed or taken up by placing the hand on top, and the oil sticks to the hands. This process is continued on until no oil can stick to your hands when you place on the oil. For the oil to last it is kept in a cool dry place.

REDDISH IN COLOUR

Other Uses of the Seed and Oil

1) Oil

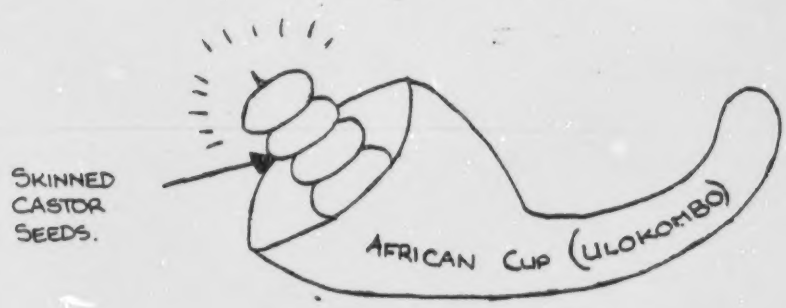
(a) It is used to rub on our bodies. It softens our skin, and it is good for our hair.

(b) It is used to fry e.g. dried bean leaves

(c) As medicine (i) given to someone with an upset stomach, (ii) given as medicine for scabies, (iii) given to someone who has venereal diseases.

2) Seeds

They are used to produce fire. They are prepared in this way. First the outskin is taken off, and the remaining white substance is put to a piece of grass (many are put to a grass). They put to it at least the length of 30 cm, we light the first one, and it will continue on till the last one. It gives good light as candles do.




Conclusion

Castor oil is very important in our life and to our bodies as we have seen above, in the explanation of the uses of oil and seeds. Mainly they were used in the past. To our result; we were successful in making the oil. Anyway this oil is coming to an end because of these modern oils, e.g: vaseline, glycerine, butane etc .....

Bibliography

We got the information from our parents and elders, for we couldn't find them in books. Anyway it was difficult because we had to walk from house to house for information.

By - Kafwshi Claudius. C.
Kachingwe Sicone Ellias.
Chaongopa K. Martin.

## KANCHINE BREWING

Kanchine is the name given to this alcohol, because of its strength.

### Requirements

1. A certain amount of maize depending on the quantity of alcohol he/she wants to produce.
2. Cassava mealie-meal of the same quantity as that of maize.
3. A pipe for distillation.
4. A tin or a drum depending again on the quantity needed.
5. A bottle for collecting the distilled alcohol.

### Explanations

1. A certain amount of grain maize has to be collected. This amount is then submerged in water until it becomes soft. The amount of maize has to be in water for at least a week. After it has been puffed up, it is taken out of water and heaped somewhere in the house. Again the amount of maize has to be in the house for two weeks so that it can germinate. When it germinates, it is moved from the house and be spread over a mat to get dry.

   At this time, when the maize is dry, it becomes black. It is then pounded and preserved until Cassava mealie-meal is found.

2. As cassava mealie-meal is found, it is then made into a dough - not too strong. The dough which is made is then mixed together with the pounded crushes of maize. The amounts must be the same. Mixing of cassava mealie-meal and the pounded maize mealie-meal is done in a drum or a tin with warm water to lessen the thickness of the dough. When this is done, a lid is pressed on the tin or the drum leaving no space for air to go in.

### Fermentation

Then the drum or tin of the mixture is put back into the house for about a week so that the mixture is fermented. When it is fermented it is taken outside. A pipe is fixed in the drum and welded around it so that the steam cannot escape through spaces left. The pipe passes again through a tin containing cold water (condenser) to a bottle. This is done before the drum is set on fire. NO yeast is added to the mixture, but cassava mealie-meal and the crushed maize mealie-meal react with each other.

The fermentation itself is done to decompose the organic substances by organisms, especially the bacteria.

## Distillation

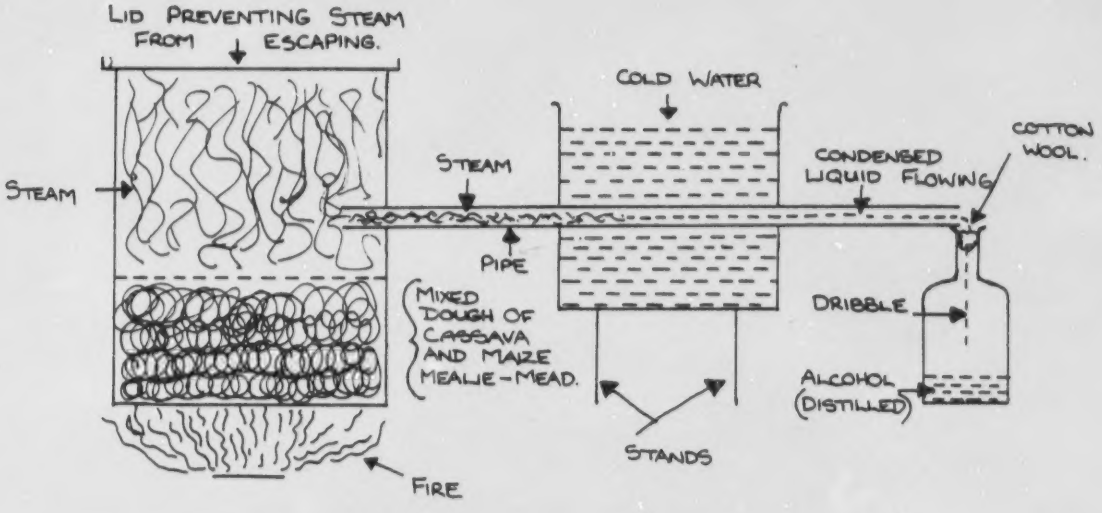
As far as the getting of complete pure alcohol from mixed substances is concerned, the alcohol is got by a process of distillation. The dissolved impurities and germs are left behind when the steam rises.

Distillation involves two processes. First of steam rising filling the space in the drum, and of condensation, that is steam from the drum flows along the pipe, comes to the condenser where it is turned into a liquid and finally flows to the bottle. When the alcohol is very strong it will burn with a blue flame.

The condenser should be on a stand or a box so that it remains at the same level with the pipe. To remove impurities which flow together with the condensed liquid, a piece of cotton wool is put at the end of the pipe through which the liquid passes.

The liquid that collects in the bottle is the real strong alcohol.

## Experiment




## Rules for Drunkards

1. If a man drinks to excess, he must not be allowed to go swimming because if he goes the chances are that he will die, even in shallow waters. This is because the alcohol reacts very strongly in a human body, and more especially in a chest. The chest becomes so hot that a person is forced to dip himself into the water. He does not only dip himself into the water, but due to the coolness of the water, he prefers to lie in the water, and when he lies in water the chances are that he will take water through his nostrils and die.

2. It has been proposed by Kanchine brewers that if a person is too drunk, his people or her people should make him porridge so as to reduce the reaction. When he eats the porridge, he or she will immediately be well again.

This kind of beer-brewing is mainly practised among the Lungu and the Tabwa peoples, but it is also brewed by other people other than both the Lungu and Tabwa.

The brewing of this alcohol will soon be abolished, because most people die when they are drunk and not looked after.

From where we got the Information and Advice

We consulted Mrs Mazimba at home, Mrs Ruth and Mrs Alas of Kapoko village and we were told the same principles. The consultations of these people were made during the holidays in April, 1976. We spent one full week making experiments. We also attended the process in the village wherever Kanchine was to be made so as to observe very carefully what the women did. Some precautions were taken especially in controlling the water in the condenser; whenever it become hot, cold water was poured into the drum.

## HOW BARK CLOTH IS MADE

### Introduction

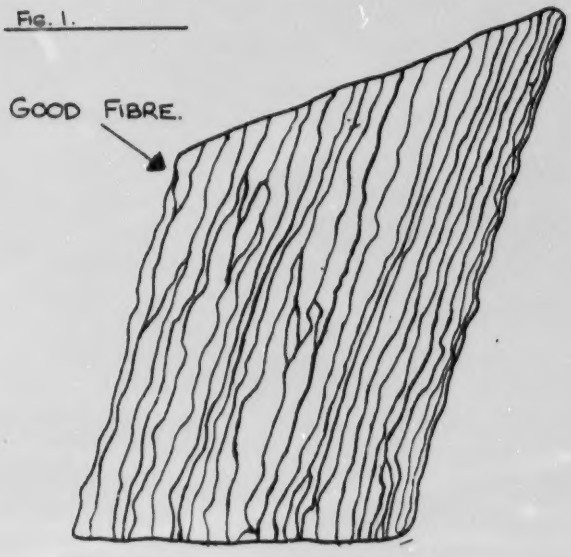
The bark cloth (or icilundu) is the cloth which is made from the bark (or fibre) of a tree. In this process trees like Mutaba, Muombo, Mube, Ngalati and Ngausa are used to produce the bark from which bark cloth is made.

Some people may think that they are better than our ancestors who were manufacturing this type of cloth, because they manufacture a lot of cloth at a time which is finer and more wonderful than that of the bark, our ancestors used to make. However, our ancestors discovered a new method of making cloth which replaced the wearing of animal hides. Unlike them, we the children of today, learn how to make modern cloth from the people who discovered it. Therefore, one is not obliged to boast although we make better cloth today because we use machines but our ancestors used their hands. So let us not forget all the things our predecessors used to do.

### How Bark Cloth is Made

To make bark cloth our predecessors, first of all found one of the trees mentioned above and cut it down or cut one of its branches. Here in this project, we used a branch of the Mutaba tree to provide fibre. The tree had to be healthy and young with straight threads lying beside one another in the fibre like in the cloth of today, and not net-shaped.

Fig. 1.



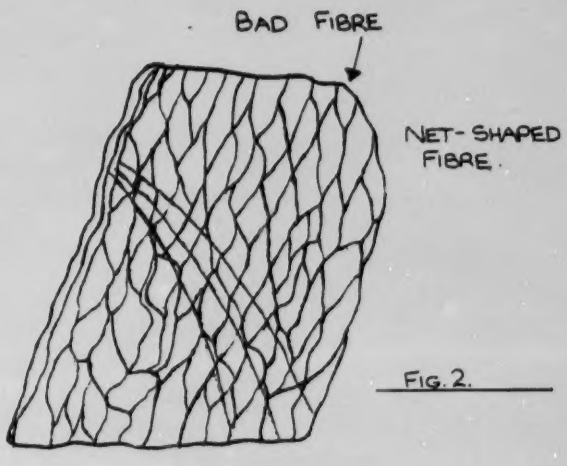




Fig. 2.

They cut down a tree or branch and cut it into pieces according to the number they wanted. Then they took the bark away from one of the pieces leaving pure fibre to it. They cut a straight line on one side of the stem like in the diagram.

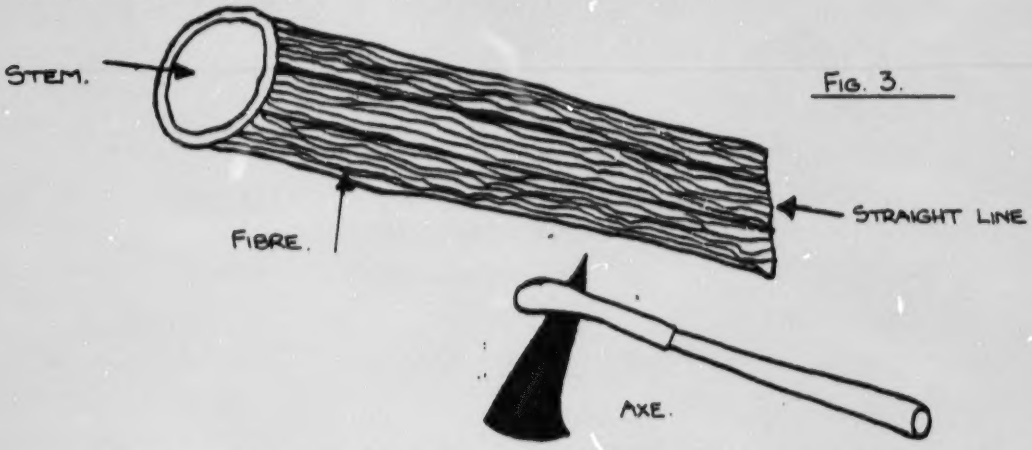



FIG. 3.

Finally, they took the fibre of the stem. They did this to other pieces according to the fibre they wanted. This fibre is known as "Inkwa". The Inkwa could also be taken from a standing tree if one wanted a big and wider bark cloth.

After this, they let the inkwa dry for at least one week. Then they put them into the river of a certain place which has been chosen. This place is called "Mulambe" with dark mud to change the Inkwa into a black colour. They left Inkwa in water in the evening and take them out of water the following morning at dawn if necessary. By using hours today, we can put the Inkwa in water at 17.00 hours and take them out at 05.00 hours in the morning of the next day. They must stay in water for at least 12 hours.

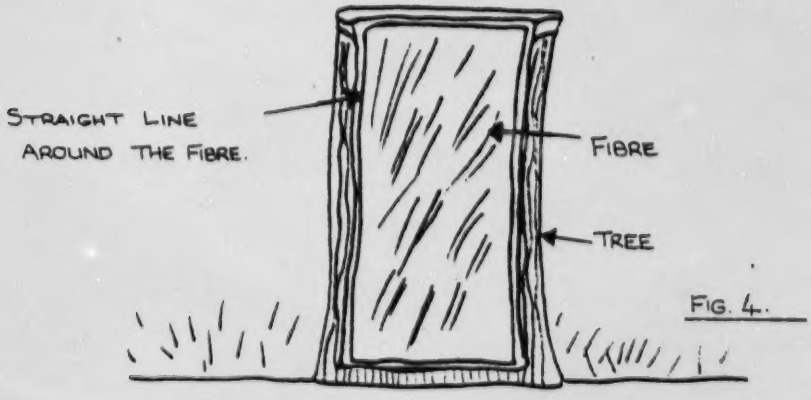
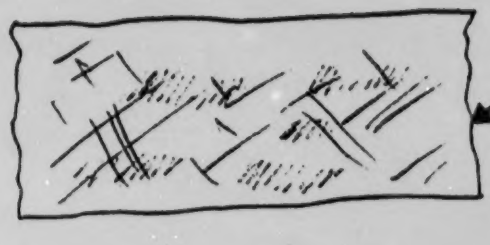



FIG. 4.

Immediately after taking them out of water, before the sun rose, our ancestors could start to beat out the bark otherwise the Inkwa would dry

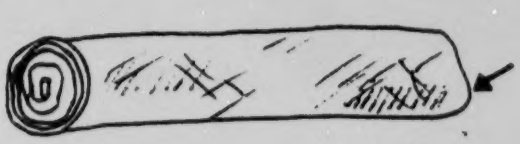
again and they had to put them into water once more. When they had finished beating out the inkwa, they would stretch them so as to expand them. They had to beat out the inkwa until it became soft, like cotton cloth. Then our ancestors had to sew the inkwa together to have the length of modern cloth; then they put it into the oil of castor bean and had to hang it in the sun to dry. After this hard work, they had to decorate the cloth by drawing different kinds of pictures on it, in order to make it look beautiful.

STAGE 1.



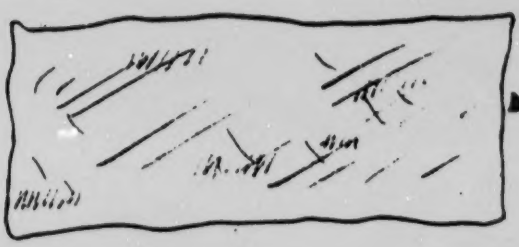
THE INKWA WHEN IT IS TAKEN OFF THE STEM.

STAGE 2.



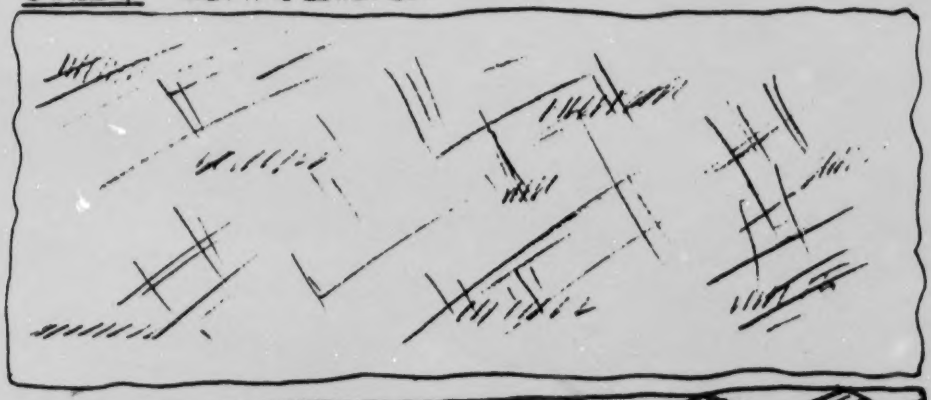
WHEN IT DRIES.

STAGE 3.

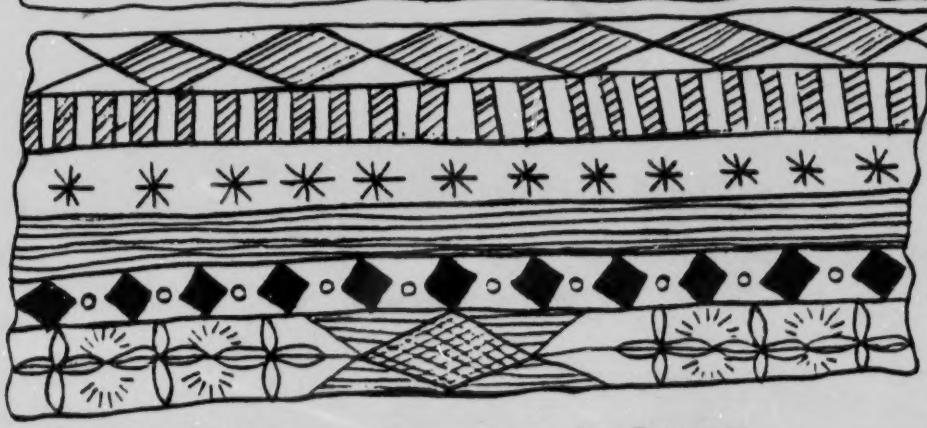


WHEN IT IS TAKEN OUT OF WATER.

STAGE 4. WHEN IT IS BEATEN OUT.



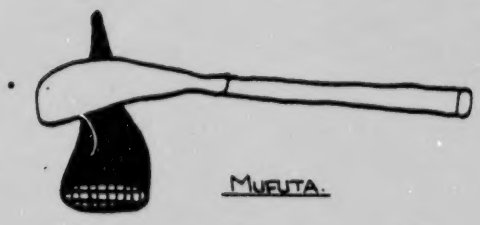
STAGE 5. FINISHED, PUT INTO CASTOR OIL AND DECORATED.



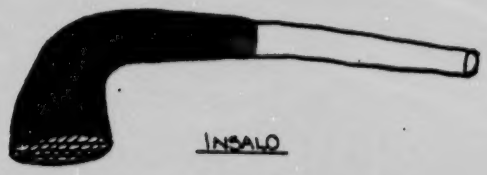
Finished put into Castor Oil and Decorated

Like this, our ancestors manufactured a smooth cloth which was very useful to them. Most of the possessors of this wonderful cloth were rich people like chiefs.

Things used to beat out the bark cloth are: Mukunku, Nsalo, Mufuta
Threads for sewing: Busambo

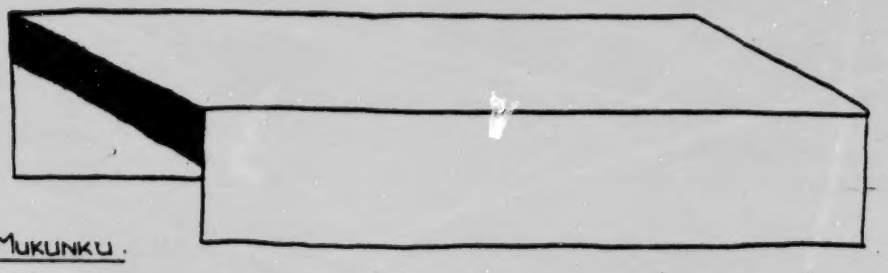


MUFUTA.



INSALO

NB The fibre we used was that of the Mutaba tree.



MUKUNKU.

Mukunku

This is how the bark cloth was being made and is how it can be made today. Finally, we would like to thank and give congratulations to the people who explained everything to us about the bark cloth. We would also like to thank my fellow students who worked very hard with much concentration to perform the project. Below are the names of the performers of the project and the people where they obtained the information.

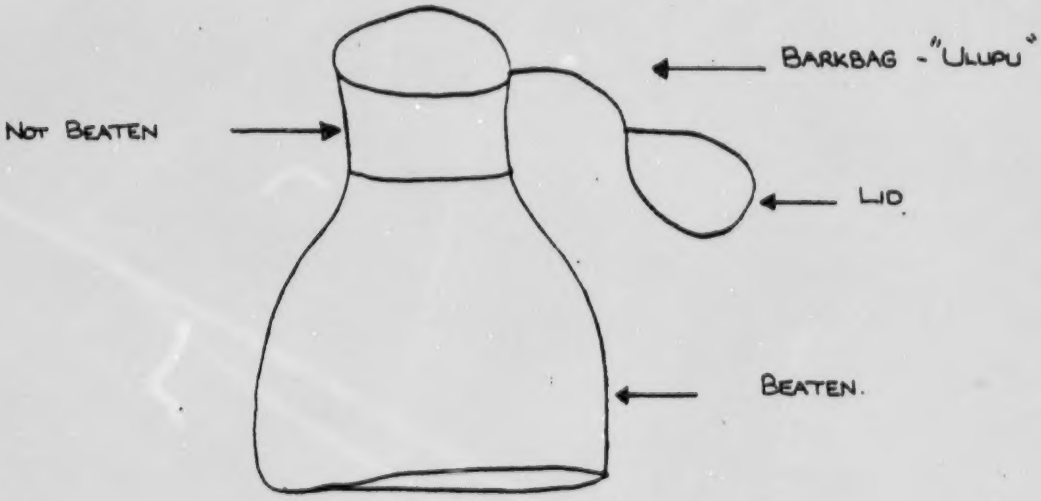
| Performers | Informers |
|---|---|
| Kapacha Henry | Mr. Toko |
| Mumbi Godfrey Ozimpo | Mr. Ngashite |
| Musosha F. Joseph | Mr. P. Musosba |
| Mwewa Christopher | Mr. Mukundubile |
| Tembo Evarist | Mr. Isae Mulinga |

We also were helped by the information from Imilimo Ya Bena Kale. By the help of these people we found it easier to make this type of cloth today. They explained everything about the bark cloth to us and we tried to put the explanation into practice.

## THE BARKBAG 'ULUPU'

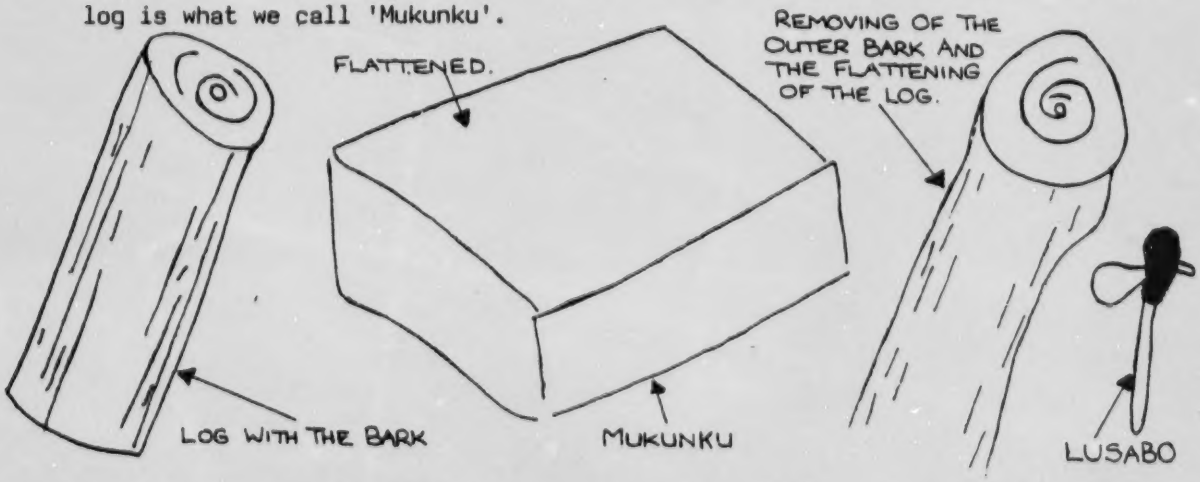
The barkbag 'Ulupu' or 'Ulufungh' was used long time ago by our fathers. It was used for the storing of mealimeal, beans and groundnuts. Usually when on journey many people filled it for carrying in their things.

This barkbag was made from the bark of a tree, the following trees were used: Mpasa, Mutaba, Muputa, and Muombo trees, the following trees were used because their fibres are good enough to last long. The barkbag was liked by people even if you are beaten by rain, it would not rot or damage like the barkcloth 'Chulundu' unless you left it where there are ants.




### The Process of Mukunku and Lusabo

If you want to make the barkbag you have to find, first a tree which is hard enough that it cannot break easily when using it for beating 'MKwa'. Then from this tree, you cut a log and you remove the bark, flatten the log using an axe called 'lusabo'. You should not flatten it at its ends but on both sides that it can be put on the ground without rolling when it is pushed. The use of this log is to put the mkwa on it when heating it, therefore, this log is what we call 'Mukunku'.

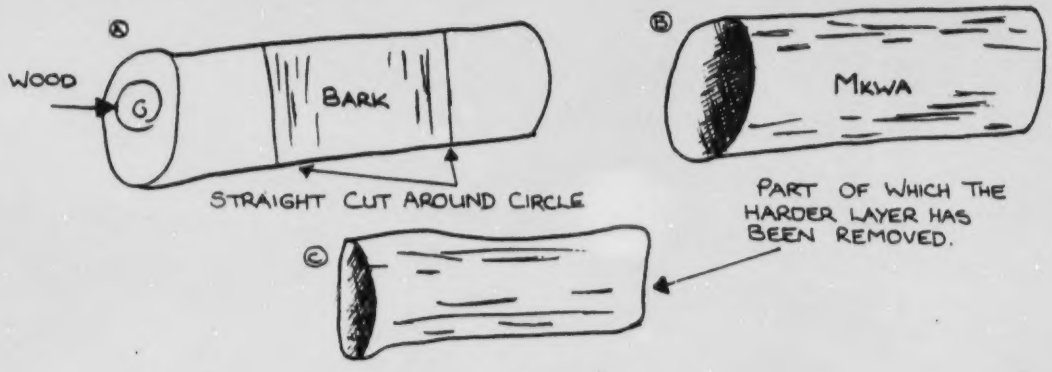


After the Mukunku has been made, the next is "lusabo", which is like a hammer used for beating the ukwa. It is also obtained from a hard tree and shaped by lubaso axe. Both Mukundu and lusabo should be obtained from Mubanga tree.

The process of making Mukunku and Lusabo takes time to be finished but the making of barkbag doesn't last long. It can either take you one, two or three days. If you are quick enough the making of the barkbag depends on what kind of bag you want. If it is the one that is tied at the bottom or that is sewn.

The one I am going to talk about is one which is sewn. The barkbag is made from the trees that I have mentioned. The best which are Mutaba and Muputa trees.

If you go in the bush you have to choose one of the mentioned trees you need. Then cut down the very tree. After you have cut down the tree again put another piece of log from the same tree. You should see to it that at its end you cut a straight round circle. The length and size depends on how much you want it to be.



After you have cut a circle around the bark, start beating the bark with a small log, till you see that you can pull it out from the main log. By this, I mean pulling the bark out of the wooden log, as shown in the drawings. The bark you have obtained is what is known as "Mkwa".

You should also know that this mkwa or ulupu is never put in the sun for drying it a bit then sank in water to make it soft again like the ukwa of the barkcloth no! Why? Because if the ukwa has been put in the sun the fibres contract and when it is put in the water sometimes it might last long there and the fibres become poor and get rotten. Therefore, the fibres are now not long enough to last long and if it gets wet again it breaks. Another reason is that, if the fibres are very fresh it makes good threads in the bag that can cause it to expand.

Therefore, if you have obtained the ukwa remove the harder layer which is on top of the ukwa removing with the fibres then put it on the mukunka now using lusabo to make the bag. Do it just as if you were making the barkcloth, but never cut the bark to make it spread. And you should make sure that it is not made to expand. And you should make sure that it is not made as soft as the barkcloth; the barkcloth needs a bit of expansion when you put something in it, like beans or groundnuts.

Another important thing, while you are beating the ukwa you should not beat at one of the ends as this is the mouth of the bag. Therefore what you should do after you have seen that it is enough beaten, cut two round pieces of the bark from the same tree making the same size as the both ends of the bag, then beat them also . After you have finished, make a good piece of string, and sew one of them to the bottom. To the other one you make a round wheel from a soft tree and sew it under the piece of the beaten round ukwa. This is then the lid. Then to the bag you make also two round wheels and you sew them inside the unbeaten part of the bag; this will not make the mouth of the bag too small.

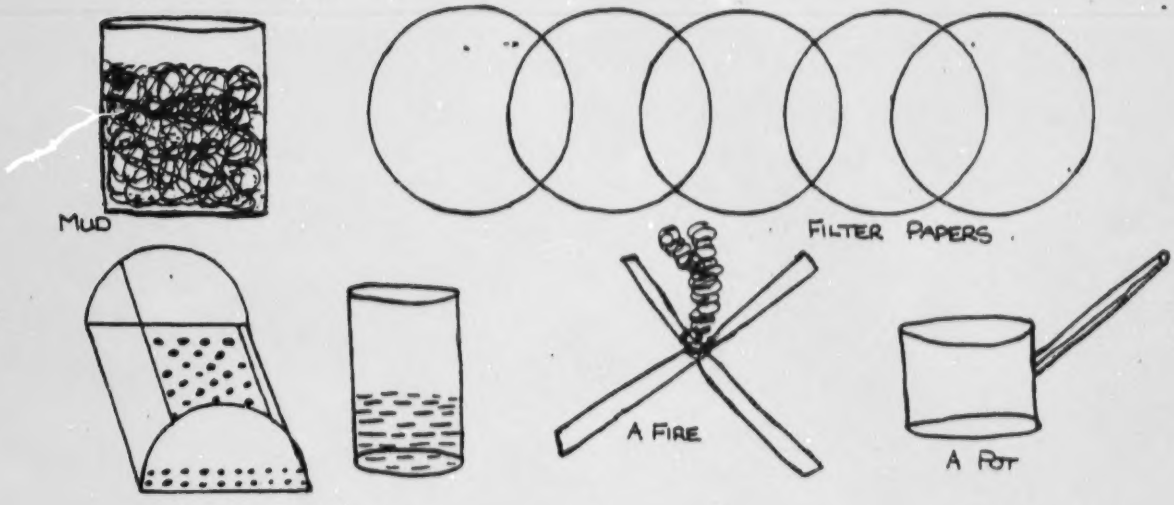
Usually when there is nothing to store in like the mentioned stuff, grass was used to make it still round that the fibres will not come together.

This barkbag was lasting long that even if it gets dry or beaten by rain the fibres were not breaking into pieces.

By - Shimulpue Denis
Katula Hason

## MAKING SALT OUT OF A MIXTURE OF MUD AND SALT

### MATERIALS

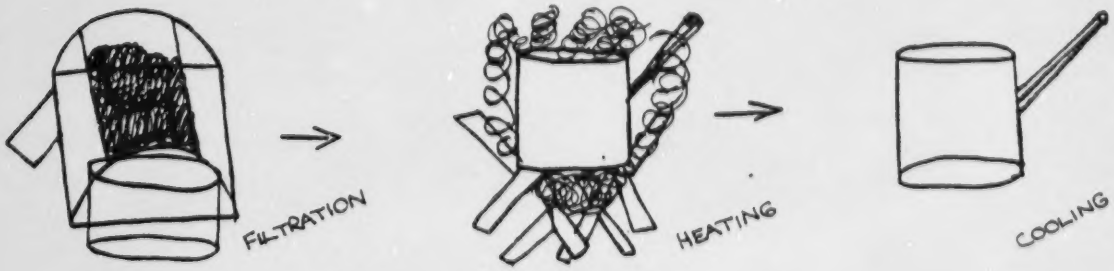



### METHOD

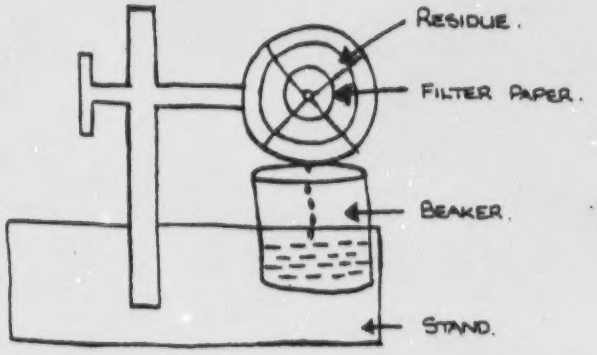
We took the mud, put it on a filter tin and under it was a pot. We put water on the mud and the water went freely through the mud carrying with it dissolved particles of mud. We continued to put on water until the salt water was equal to the amount we needed.

After this process, we found out that the water was not completely pure, so we tried to put a cloth between the pot and the filter tin and we put grass in between the filter tin and the mud. By this method, the water was made pure; it took us 45 minutes.

We took the water and heated it. When it was on the fire we stirred it from time to time and when the liquid was thick like porridge we took the pot out of the fire, and after some minutes the liquid hardened up. The diagrams to illustrate these things are as follows:-



When we brought the salt to the master in charge he told us to dissolve the things again because it wasn't very pure. We dissolved it and after that, he gave us a stand, five filter papers and a beaker. After dissolving the salt we passed it through filter papers. On these papers, we noticed the residue which was left on the filter paper. We took one hour to do this second filtration and the diagram is illustrated as follows:-




We started to filter again. Five filter papers were all used. To show or know that there was salt in our water we took the glass put on water and left it on a window. It took half a week (4 days) for the water to evaporate and really leave salt. Then we proved that salt is in our project. The rest of the water was put in a beaker. We don't know how many days it took for the water to evaporate.

CONCLUSION

If we have two different substances mixed together, we can look for a way in which we could separate them. If paraffin and water mixed together, we can separate them by means of 'fractional distillation' because all of them have different boiling points. So it doesn't mean that we just took table salt and mixed it with mud, no. This salt was mixed by God. The salt is recognised if on a certain place in the 'Ikungo' (a place where there's too much grass and is flooded during the rainy season) where there's no grass because the grass is being dried up by salt. As if there's too much fertility in the maize and the maize become to dry up.

In old days salt was very important. Salt was used for exchanging things. If one has a tin of salt and the other one has 1 metre of cloth they exchange straight away. Also it was used to pay the trouble in a village e.g. if a boy kills a chicken, the mother of the murderer was supposed to pay salt instead. In old days also, salt was used to reward someone because there was no money so they used salt as a means of value.

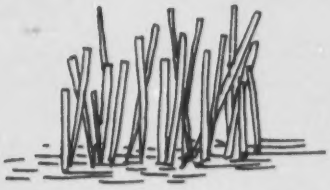
BIBLOGRAPHY

We got it from a book entitled 'Imilimoya Bena Kase' which was written by L. Kasonde.

By - Leonard mwape, Mwila Clavel.

## PROJECT OF CIBWA

Cibwa Salt is mainly found in northern province of Zambia in Mpika District. This kind of salt is in a sort of grass as drawn below.



CIBWA GRASS - GREEN WHEN FRESH.

Just under the grass, things like (Samfwe) grow. When ever this is found, (mainly in plains) people clear away the useless grass and leave cibwa in a cleared place.

In August this grass is collected by using hoes and spread on the ground to dry. This grass may remain on the ground for about two months. When it is dry it turns brown in colour.

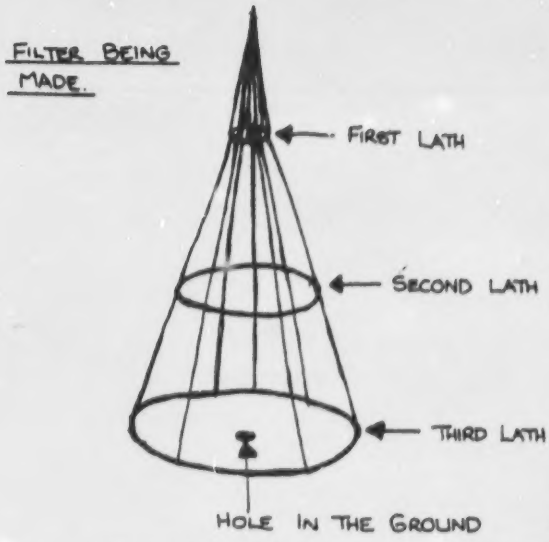
- TURNS BROWN WHEN DRY.

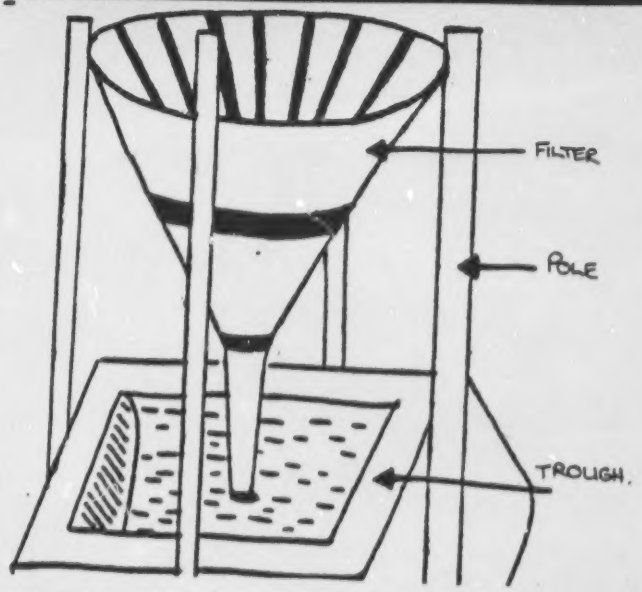
In September or October the process of making salt starts. The people first go and make shelters because this process spends more than two months.

Things needed by the people when going there are: clay pots, hoes, axes and many others. They also carry things such as impao that is mealie-meal and relish used when doing the extraction. With this kind of salt, no sacks are needed due to the fact that it is powdered, but also mats are not necessary as this kind of salt is dry and solid when produced.

Before anything is done we need four poles which are fixed into the ground. When these things are prepared, the fibres are needed. Then we look for grass to make a filter and find some small soft sticks which can help the filter to stand. To make the filter, we dig hole in the ground which is about 15 cm deep and fix in it a pole of about 45 cm long.

Around that pole we make a circle according to size of the filter. Around the circle we put small sticks which meet at the point on top of the fixed pole in the middle of the circle. We tie these small sticks and then take laths and tie them at the end of the small sticks on top. One of these laths must be outside and the other one inside and between them we put grass which is taller than the height of the filter.




Also in the middle we put another lath and another which is to tie the lower part of the filter. After we have finished tying then we can get out filter, then we take this filter and hang it between four poles fixed in the ground. Just below the filter there is a trough which is also between these four poles and it is in this thing that the solution is collected. It is made from the tree trunk. Mainly these troughs are made from trees such as Musafwa, Kaimbi, Mofu, Lupangalor, Somingo.

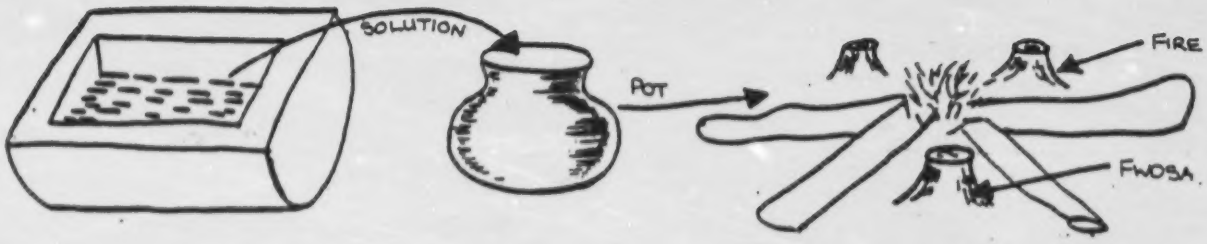
When a tree is cut down, we cut a piece of this tree which is of the medium size and of the length as we want. This piece of wood which we have cut is then turned into the trough by making a hole in the middle starting from the top but it shouldn't go through the wood. Tools needed for making this trough are an axe and imboso in the form of a small hoe.

HOW SALT IS EXTRACTED

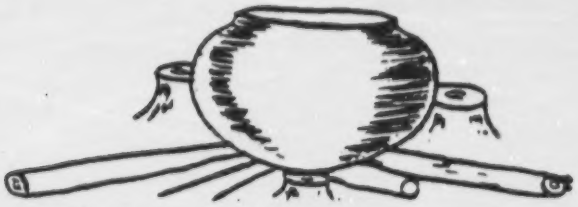
When we have got all the apparatus, the last thing is to make use of Cibwa grass. Cibwa salt is extracted in August, September and October. People go to the place where they left their cibwa grass to dry and there they build shelters which are for temporary use. Two days later, they will start burning off this dried grass so that they can get ash.

This ash is put in the filter and then water is added to the ash in the filter. This is a process of filtration which is to separate the insoluble impurities from the soluble impurities which is the solution in which our salt is found. The solution collected gives sour taste.

Then this solution is poured in clay pot. After putting this solution in the clay pot, fire is made.




After putting the solution in the pot and the making of a fire, we then put this pot on fire so as to let the liquid evaporate and leave the salt behind in the pot. We must need a big fire to make the water evaporate.



To get the salt after the evaporation of the liquid and after the cooling of the pot we just crush this pot gently and carefully so that we may get the salt not in the form of a powder, but in a solid state.

This kind of salt is mainly called Icimondo, Icibindi and Cimbjsu Camicee.

MOST IMPORTANT USES OF THIS SALT

This kind of salt is very important in the way that it helps us in the strengthening of bones, teeth and clotting of our blood.

There are also uses such as the putting in a relish and to the meat which is fresh to prevent it from getting rotten if we don't have fridge.

The people near Lwitikila Swamp still make this kind of salt in the same method as explained in this project.

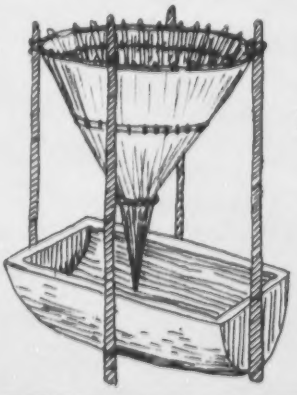
The grass of Cibwa grows mainly in sub soil in the plains.

BIBLIOGRAPHY

Imilimo Yabeno Kale written by Koande.
Motomofo Museum in Mbala
Mr. Patric Chisanga.

PARTICIPANTS

Michael C. Nasenge.
John K. Bwalya.



SALT FILTER

## HOW TO MAKE FIRE BY THE HELP OF FRICTION

### HOW WE FOUND THE PROJECT

To make the project, we asked elders to tell us which kind of project we should make, and they told us to make fire by the help of friction. They explained why they told us this kind of project.

They told us that this kind of making fire existed long before any means ofmaking fire was introduced, and we were very interested in the explanation, so we decide to make this project.

### INSTRUMENTS WHICH THEY TOLD US TO USE

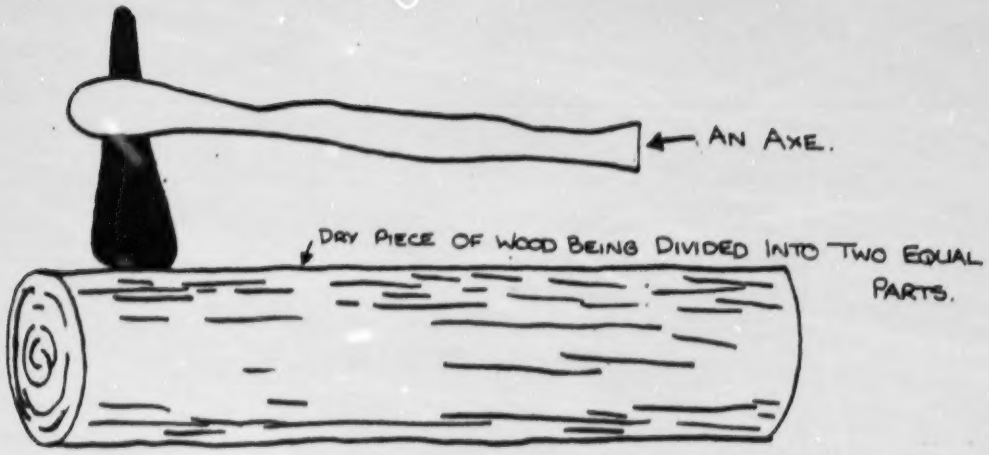
They told us to use an axe for cutting pieces of wood with. Not all trees are used to make fire with. There are certain trees which are very good to make fire with. The name of trees used to make fire with are:

1. Umwengele: This must be 3- cm long, but you must take the size and length which you prefer to the others. The most important thing about this wood is to make sure it is dry - because you can get fire with dry wood, since it is of friction.
2. Umufutu: This must be also dry and the length you prefer as described above.
3. Umusuku: Also the same as Umwengele. It must also be very dry as the two above mentioned trees.
4. A reed: This must according to what you like. If there is no reed you should use Umwengle.

We used those above mentioned trees to make fire with because of their softness. If you use hard trees it will take time for the fire to come out of the wood. It is useless to use hard wood in order to produce fire by friction because you will not be strong enough to produce friction to overcome the hardness of wood. So this is why soft wood is preferred to hard wood. Another reason for using soft wood is because fire is prepared for urgent purposes and if you used hard wood you can fail to produce fire since you are in a hurry.

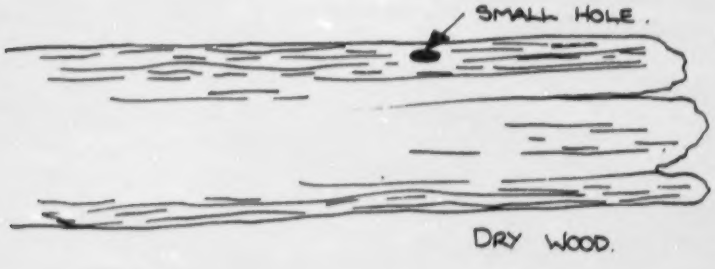
### HOW WE MADE FIRE

1. The very first thing to do is to take the piece of wood which has been cut already and is very dry. Then divide it into two equal pieces. The diagram overleaf represents what we did in this first stage.



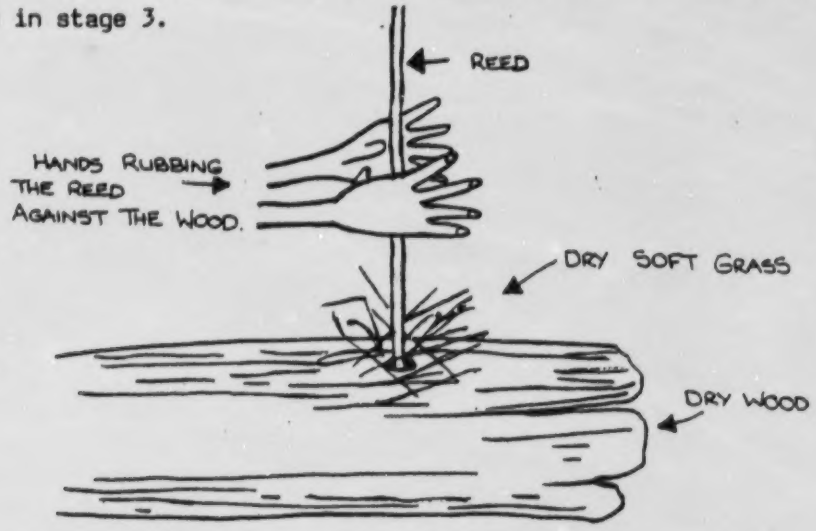

We are in stage 2 now of how wemade fire. We have already seen what to do in stage 1.

2. The second thing to do is to take a piece of wood which has been cut already into two equal halves and make a small shallow hole in the piece of wood you have cut. The hole must be made near the edge of the big piece of wood you have cut because when friction starts, the hot black material of wood, produced can come out easily and burn the soft grass which is next to it. The hole must be made in such a way that a piece of reed or umwengele will fit properly. The diagram below represents what we did in stage 2.




3. After doing preparations of stage 2 you have to put very dry soft grass near the edge of the wood, so as when fire is produced it can light up the grass and fire be produced quickly. This is the last stage in making fire. After all this, take a reed and the dry piece of woodland then take the reed and put it in the small hole you have made. Then start rubbing vigorously without stopping. If you are not powerful enough to continue rubbing or tired you can ask your friend to help you. Once you have started rubbing, you do not need to stop because if you stop, you will reduce the friction between the wood and the reed. If you reduce the force of friction between the wood and the rest you will not get fire because you have reduced your friction which is to produce fire. Always be careful when rubbing because the reed often gets out of the hole if you are not pressing too hard. After

a very hard vigorous rubbing you can see steam and black wood material goes from the wood to the soft dry grass through the narrow channel like passage you have made. Once you have seen this hot black wood material, continue rubbing so as to produce the bottest of this black wood material to cause the soft dry grass to burn. This black wood material is made even hotter and turns into small amounts of fire. Once these small amounts of fire are produced you can blow on them. We blew on the fire so as to produce enough supply of oxygen to the fire which helps things to burn better. Not only for the purpose of supplying oxygen that we blew on the fire, but also because the fire which comes out of the wood is not in the form of a flame, so when we blow on the fire flames can be seen. Below is a diagram representing what happens in stage 3.




So the most important thing to remember when making fire out of friction, is to continue rubbing so that the force of friction between reed and wood is very great to produce fire. If the force of friction between the reed and the wood is not great, you cannot get fire. This is how ancient people were making fire.

As we know fire is very important because when there is no fire, we cannot cook or roast our food. Ancient people had nowhere to buy matches, so they had to invent the means of making fire to use it for different purposes. They had to heat iron in order to make axes and all sorts of metal things. They wouldn't have smelted if they had no fire. Often when the ancient people were on the journey, they had to carry instruments for making fire, because they had no motor cars to travel by and they had to sleep before reaching where they were going. Since they carried instruments for making fire, they cooked their food without any difficulty.

Now we, to whom they have left this method of making, why can't we improve the making of fire? Let us improve it, so that they may be happy in our discovery as we are happy in their discovery. Whenever you have difficulty of fire, you can refer to this method. So thanks to the ancient people for their discovery. Let us not forget that they are waitihg for the improvement of their discovery.

HOW DOES FIRE HELP MAN

1. By cooking food.
2. By roasting food.
3. By getting warmth from it.

Makers of the Project are;

1. Felix Mulenga.
2. Barnabas Mulenga.
3. Albert Myshota.
4. Sungancito Francis.

# BELLOW MAKING

## 1. Aim of the Project

Oxygen helps things to burn. In this project, compressed air is forced out to maintain a high constant temperature.

## 2. Its History

Many, many years ago, people were using sharp pointed sticks to obtain food and for killing animals. This was a difficult task, because this caused or led them to the discovery of metals. It happened maybe accidentally that someone threw a stone into the fire and after sometime the stone melted and that was found was metal. This came to the minds of the people that there was really something which could make their lives to proceed well by making better tools and weapons. The first metals to be discovered were: copper, gold and silver. This is about 7,000 years ago.

These metals were not hard enough to produce a hard sharp strong flint. These metals were only used for ornaments and decorations because, they were considered to be less harder. Gold, copper and silver were to be mixed with other metals to produce a harder metal which is called an alloy, like bronze and brass.

It was found that these metals were not used for making any tool. Therefore they had to discover iron which was harder to produce a better tool and weapons.

Early iron workers must have had something like a pair of bellows to make a strong blast of air to blow upon the red hot mixture of iron ore and burning charcoal. Blacksmiths or smiths, who were a common type of skilled workers until two generations ago, in a somewhat similar way had bellows in the smithies. But this was just their earth fire of fire coal, hot enough to soften the iron. Then when this was soft, they could hammer it upon the anvil.

Iron ores should have been discovered in many parts of the world, for iron is the most useful daily life of the all metals.

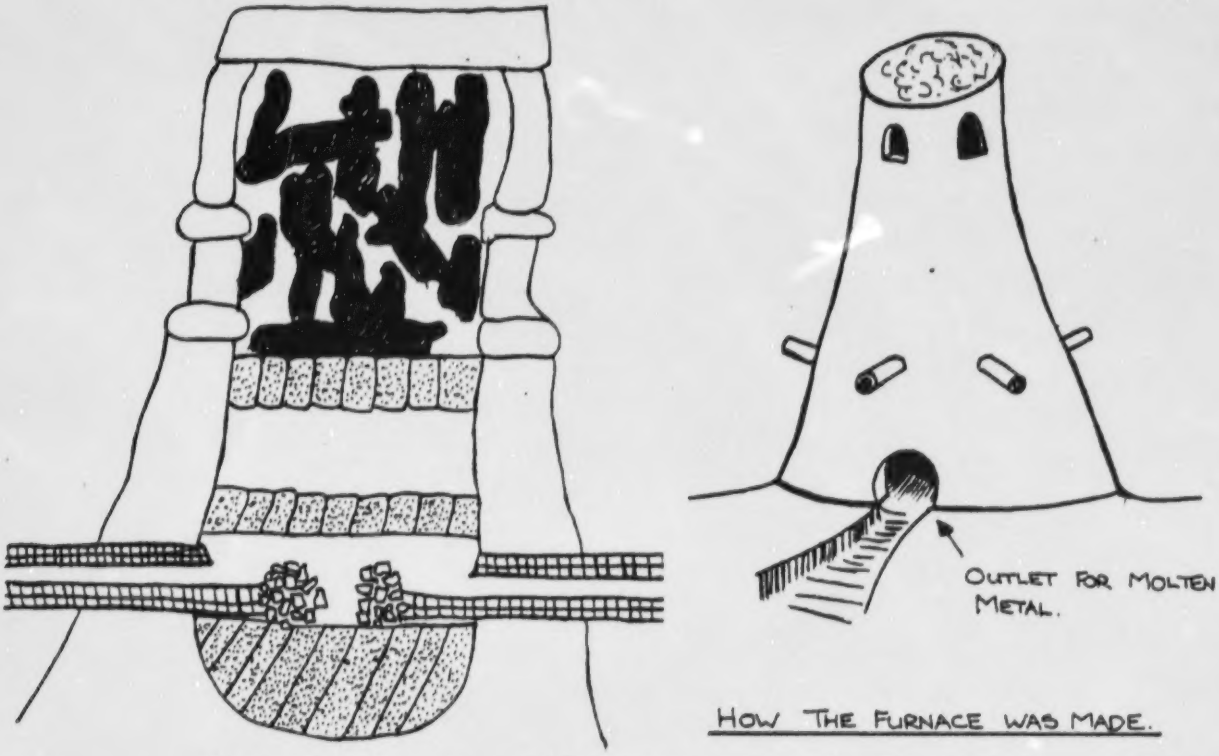
In discovering of all these metals, civilisation started to develop very badly.

## USES OF METAL

To make digging hoes, axes, shaving instruments, knives, arrow heads, tongs, hammers, spears and wires etc.

## EXTRACTION OF THIS METALS FROM ORES

1. Open pit mines were used to obtain the ores.
2. The ores were taken to the furnaces and were put in the furnace.
3. Fire was put into the furnace.
4. Compressed air from the bellows was forced into the furnace.
5. The iron should reach the melting point of about 1200°C.
6. The slag sinks at the bottom of the furnace and the metal floats on top and forces itw way out where it pours into a well-made mould. The moulds were made according to the shape of the object they wanted to make. Things which were made at this point were: copper ingots used as money, wires for bracelets and other decorations, etc.




HOW THE FURNACE WAS MADE.

Molten clay from the ant-hill which was always near the streamwas used to build the furnace. This is good soil because when dry, it produced a hard earth stone. The furnace was built near the ant-hill. It was made in a circular shape. Its diameter was 1-2 metres. It was big at the bottom and grew smaller as it went up. The top was flattened.

## HOW CHARCOAL WAS MADE

"Special woods" were burnt in the open air. When wood was burnt enough (charcoal), it was taken away from the fire and water was poured on to stop it burning. This was done repeatedly until sufficient charcoal was obtained. Charcoal contained carbon.

Names of trees from which woods were obtained are: Ndale (hardwood with small leaves), Mubanga (hardwood), Musokolobe (not very hard), Mulombwa (hardwood), Musase and Saninga.

CONCLUSION

Bellows were very important at that time and without them man couldn't have lived a better life e.g. growing crops for food. These things needed hoes and other tools to grow them and to make hoes, axes. These things were to be melted by using bellows.

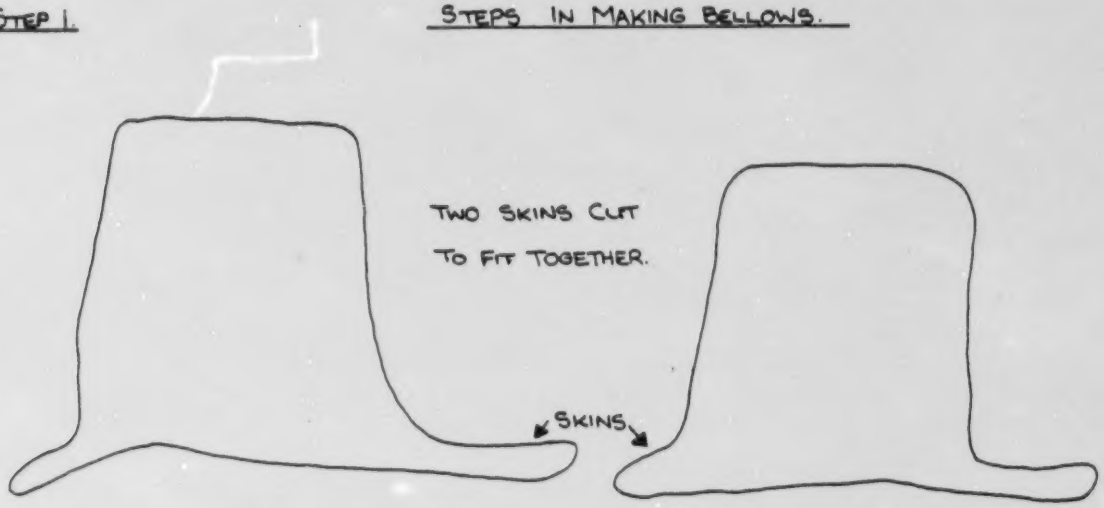
BIBLIOGRAPHY

References from the books called 'Imilimo ya bena Kale'.

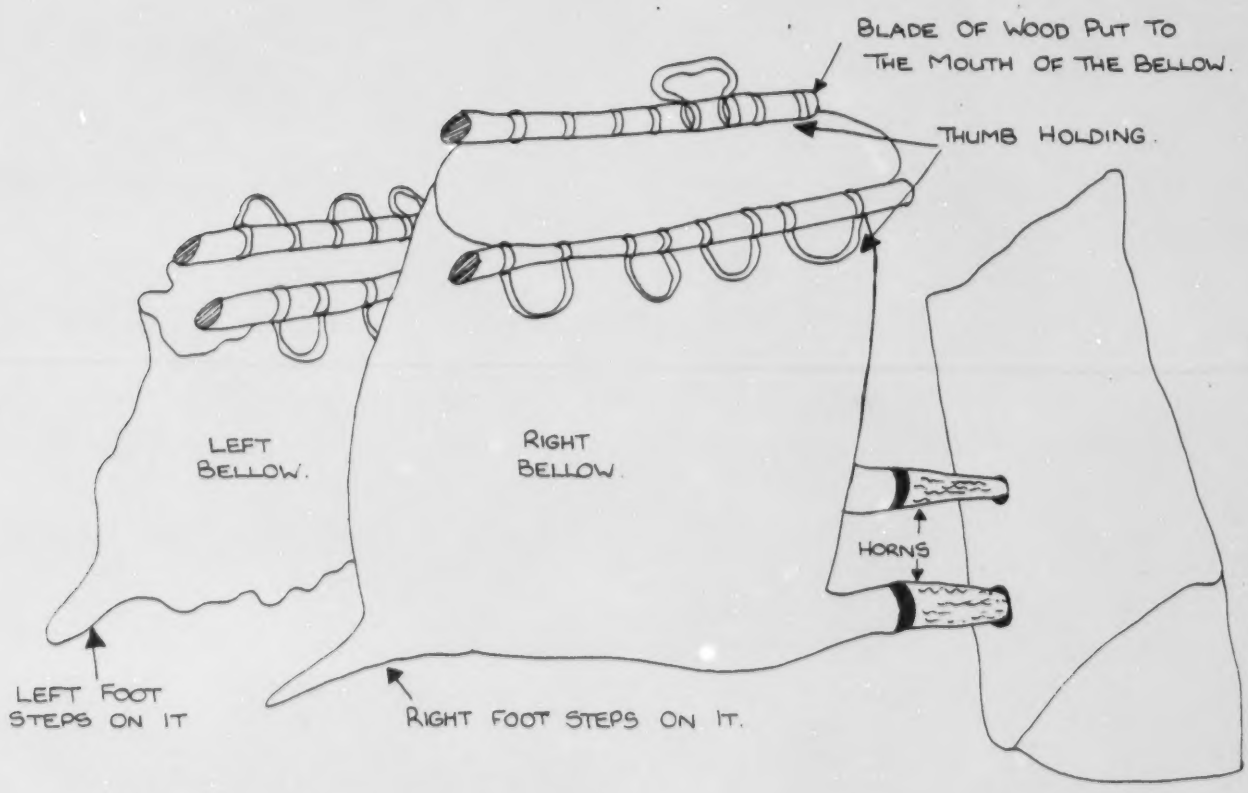
Metals and Man and from the elders showed us how bellows were protected. Members Joseph Munba, Chrisanthus Mukuku and Joackim Musondah.

STEP 1.

STEPS IN MAKING BELLOWS.



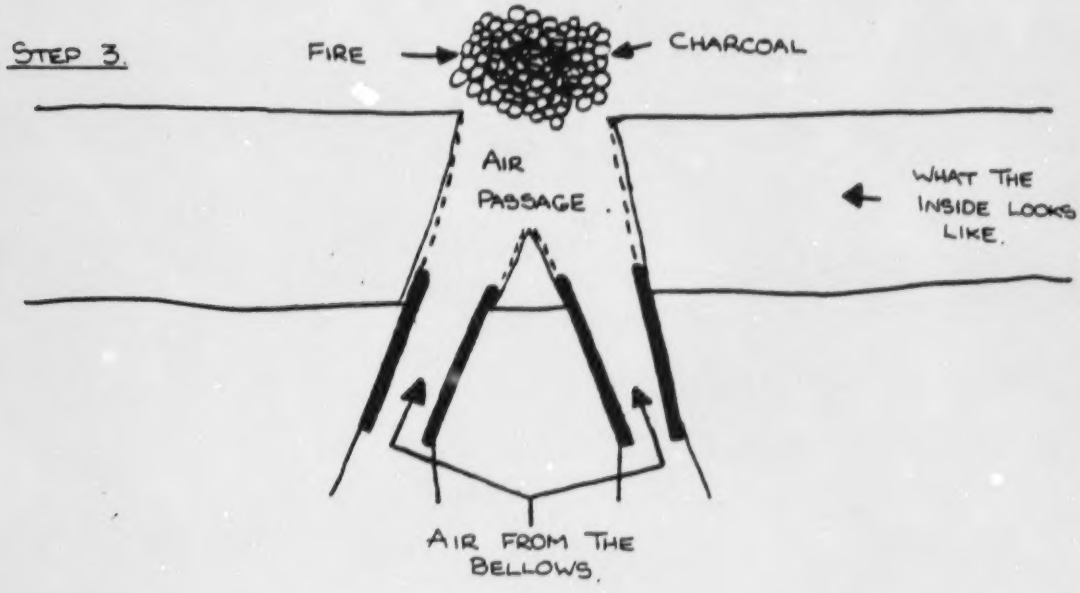

Skins were cut according to the size of the bellows that they wanted to make.

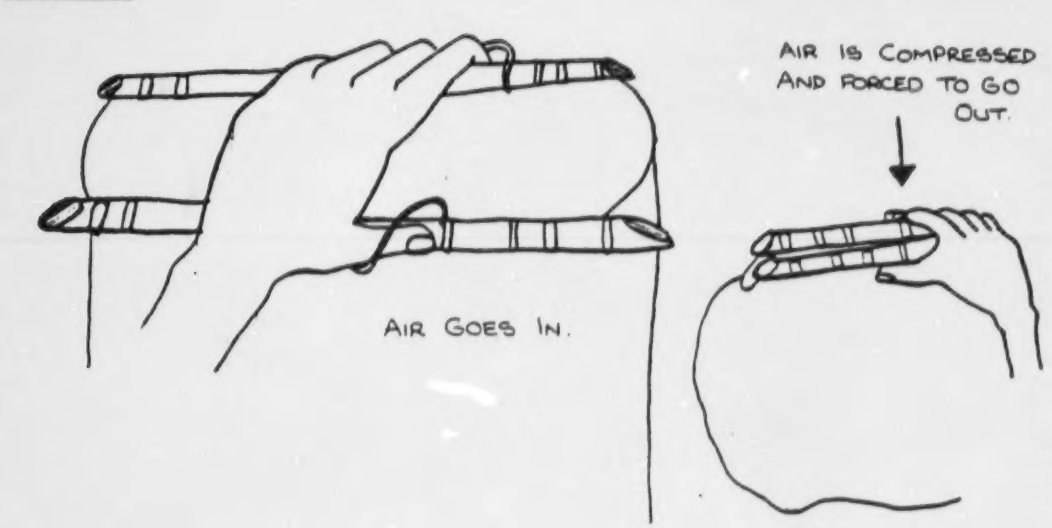


MATERIALS FOR MAKING BELLOWS

Small slices of skins of strings were used for sewing up the main skins. Suitable straight horns about 30 cm long were used to take out air from the bellows to the fire.

Medium thin skins such as chicken's skin, partridge's and water bucks skin etc. could be used. Four blades of wood, two to half a pair and the other two to the other pair. Castor oil or grease were put to the bellows to soften them.



## CHARCOAL BURNING

Not all types of woods can be used to make charcoal. The requirements needed in wood so that a better yield of charcoal is obtained are;

The wood must be hard.
The wood should not contain large amounts of volatile matter.
It should not tend to burn, even when heated in a limited supply of air.
The charcoal produced from the wood must have sufficient mechanical strength so that the charcoal does not easily crumble while being moved about for sale.
The ratio of the volume of charcoal produced should be high to the volume of wood.

A better quality of charcoal can be made from the following trees:

Muputu
Mupundu
Mutondo
Muombo

These are all hard woods containing no volatile matter in them.

### CUTTING AND STACKING OF THE TIMBER

Process: Once a tree is cut down, it's cut into lenghts of about 1.5 metres, wood of smaller diameter is likely to burn to ash during the burning process.

When sufficient lengths are available the wood is then stacked into piles.

### COVERING THE PILE AND BURNING

The pile is covered with a layer of turf in order to limit the amount of air once it has been lit. Then the pile again is covered with a layer of earth. The earth can either be wet or dry. During the covering of the wood a small hole exposing some of the wood is left at one end of the pile. This hole is filled with grass and any other material which is inflammable. This material is lit once it has caught fire the hole is covered with turf. What should happen in the pile is that a small amount of wood should burn and produce enough heat to heat (not burn) the remainder of the wood and convert it to charcoal.

To produce a better yield of charcoal care is taken to control temperature. If the rate of heating is too high the charcoal will quickly be produced but in poor yield. The charcoal too will be contaminated with ash. Rainfall and wind should also be controlled or they will alter the rate of combustion.

Should too much air enter the pile, the woods will burn to ash. The changing of wood to ash is known as a chemical change since we don't get the wood back from it.

Because the pile is supplied with a limited supply of oxygen , carbon dioxide is produced. The rising of this gas from the pile is a sign to tell that wood is being heated to make charcoal. A serious calamity that might occur during this stage is the partial collapse of the covering. This will expose the wood to air; and will result in losing a lot of wood ash.

The decrease of the pile shows how far the wood has undergone burning.

The burning period lasts from seven to eight days.

Collecting of the Charcoal

When the burning is completed as indicated by a lack of smoke and a decrease in height along the whole length of the pile, the pile is allowed to cool for about a day. If it's not cooled and yet we open it, it will immediately catch fire because the charcoal is still at a high temperature.

Use of Charcoal

Used for cooking.
Charcaol has the property of removing coloured impurities from final products.
Used in the purification of sugar.
Used for smelting metal, e.g: copper and iron.

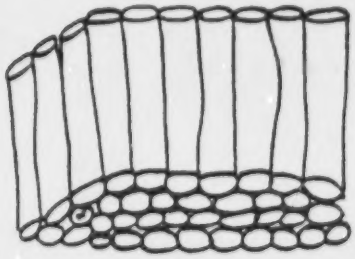
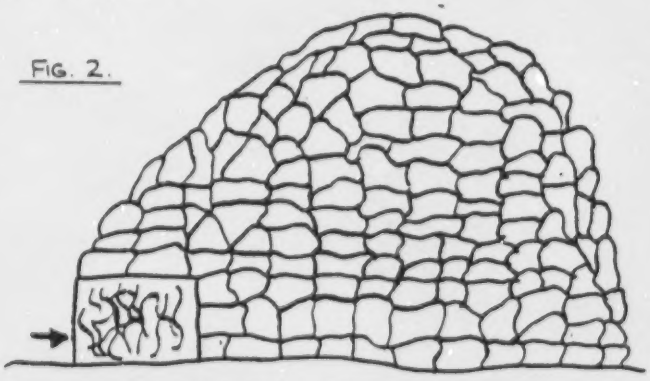


FIG 1. STACKING THE PILE.

FIG. 2.



COVERING THE PILE.

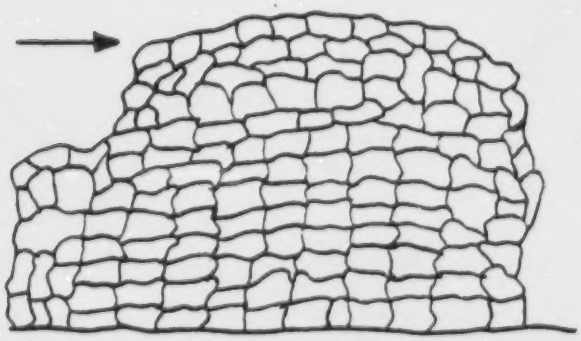


FIG. 3. DIRECTION OF BURNING

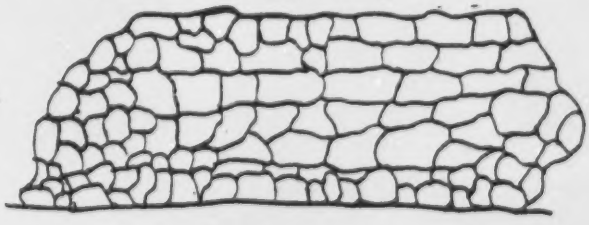
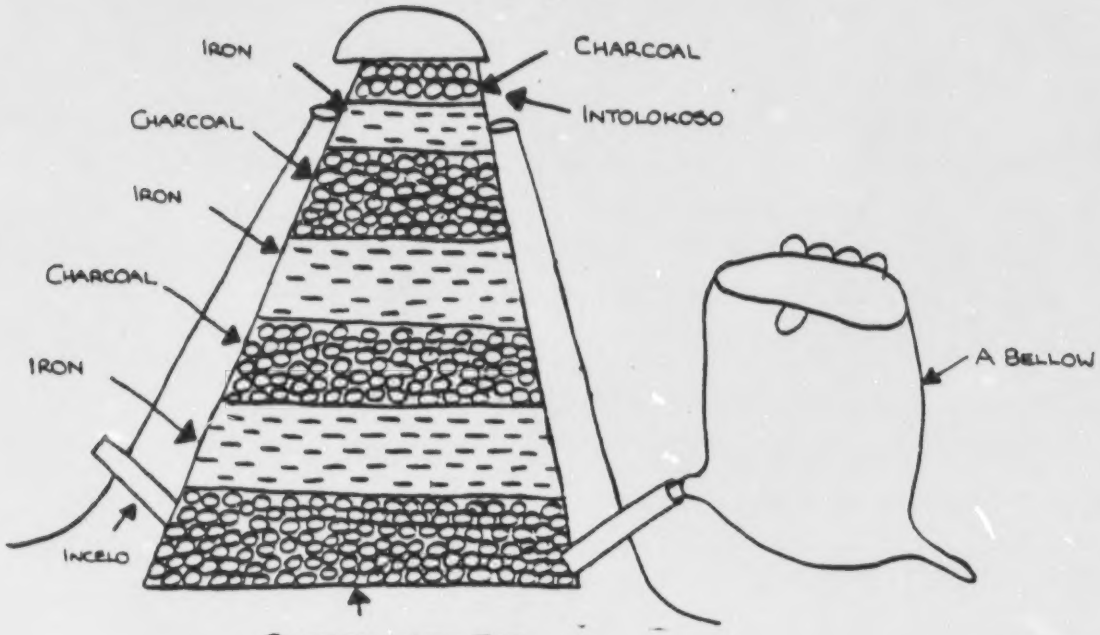
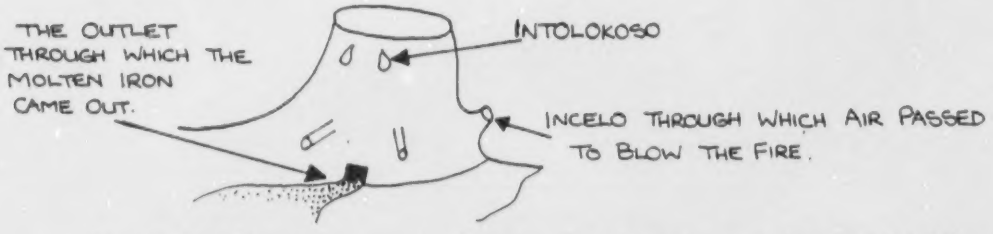


FIG. 4. THE PILE COLLAPSES.

# IRON SMELTING




Our forefathers used to smelt the minerals in a different way from today's. Before the minerals were exploited out they first built a big furnace in which they were smelting their minerals. In the furnace they were leaving some holes each having its own work. They were leaving Intolokoso, the oulets (incelo) so that when the air was glowing, it could pass through inceto to blow the fire which was made. They also prepared bellows to blow the fire under the furnace before all the things mentioned above started working. Finally they had also to leave a hole at the bottom through which the molten iron came out.




First of all, they were going in the forests and in small hills to look for minerals. In these hills they found precious stones which they knew were good. They were very bright, when they saw them. so they went back home to take the tools for exploiting out the minerals. During this process they had to dig an open pit mine. This was a little bit deeper so that they could get the iron ores which were under the surface of the earth. They always didn't want those stones which were deposited near the surface

because they were not useful and they had to leave them aside. The minerals were exploited in great quantity so that it could be enough to make tools from it.

HOW THE FIRE WAS MADE AND HOW THEY PUT ORES IN THE FURNACE

They made fire in the furnace. After they had done this, the charcoal was put on top of the fire and then followed by the ores, then charcoal again, then ores until the furnace was full depending on how much ore they had put in,charcoal was always the last on top of the ores.

After they had done so then they started blowing the fire using bellows. The bellows blew the fire so as to enable the charcoal to catch fire, so when charcoal had caught fire it burned the ores and they melted forming a liquid called Mottern. It came through the outlet. The residue was a special name for the mottern. When there was fire in the furnace then the blowing in of air was not to be done as much as before. The amount of air now needed was not great. This was because every piece of charcoal in there, was on fire. The blowing was just inportant to keep high temperature. When the ores have started melting the residue or mottern had its outlet. As far as we know that the iron is heavier that its rubbish so it had also its own outlet below. The mottern had its outlet, and the iron had to be on the other side of the furnace. So when it had finished melting they let it cool and afterwards it was collected.

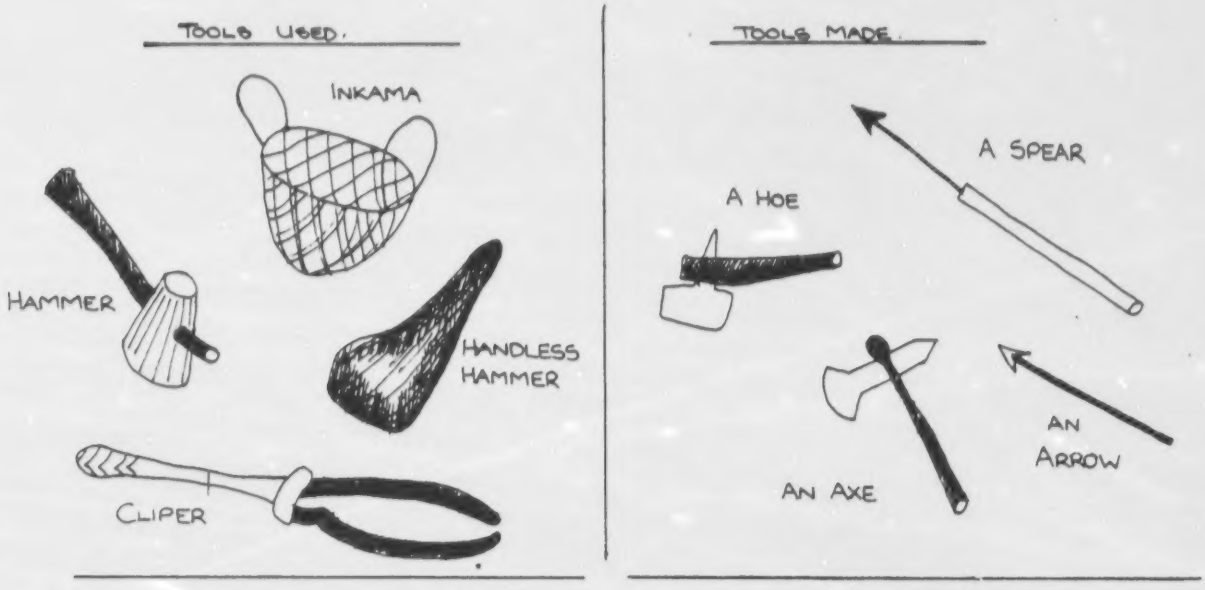
WHAT THEY DID WITH THE IRON(PIG IRON)

These people let the iron cool in the same containers. This iron which was let cool is called 'Pig Iron'. When it was cool they took it to their homes. At home they again started heating the 'Pig Iron'. When this is done they then hit it with a hammer to make it in proper shapes. After this they started cutting it by means of hitting with a hammer. When they had cut it in pieces of various sizes, they then started making things from these pieces according to their size.

THE THINGS MADE FROM THIS IRON

The pieces of iron which were cut in small sizes were put on the fire again so that they could easily be made into tools. When they had taken this out of the fire they started hammering the metal with a hammer. They used a clipperto hold this hot metal. When it was well flattened they again hit so that they didn't burn themselves. When they had finished hammering they took a heavy metal called (Inkama) to level the metal. When it was well flattened they again heated it and hammered it. They repeated the process

of heating and hitting until they made a hoe, with a very blunt digging edge. Now it was time to use a handless hammer to make the digging edge thin and a little bit sharp. For them to stop this they had to make sure that the edge would easily be sharpened. When they were finishing they heated the hoe for the last time. When the edge of the hoe was red-hot they then took it off from the fire and dipped the edge into the water which was ready prepared for this purpose. The water here was used to make the hoe strong and if this was not done the hoe could break just the very day one started using it. Axes were also made through the same process except bangles. Bangles were made from little pieces of iron cut about 2 cm wide and 4 cm long. This kind of bangle would be for a fat person, for when heated and hit, it increased in size (expanded) and length, due to the expansion of the metal. When it was made to their liking they then curved it to make a beautiful bangle.



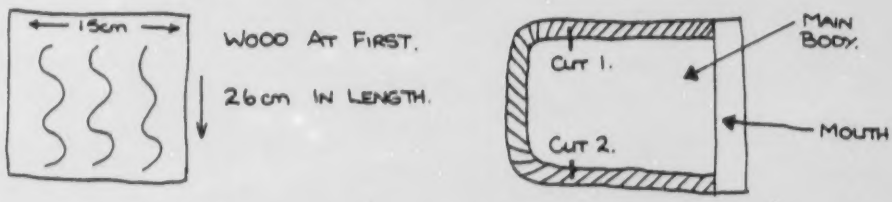

By Stephen Chikonto.

## BEMBA MAKING INSTRUMENT - MUMAMBA

We went into the bush, we cut a piece of wood about 26 cm in length, and 18 cm in width. On one flat top of the wood, we drew a rectangle measured 15 cm in length and 3 cm in width. This is the area in which a hole will be dug. We started digging the hole using a chisel, the hole went down by 18 cm in depth.

We then started the carving to make it portable. We made it lie down on its back and very careful on its stomach. We carved leaving two large lips on both sides of its length, so that it had two steep sides like a valley. This is done to make the bridge stand easier.

Diagram to Show the Mouth and the Lip




Then 8 cm away from its tail (the thin end) on the lips we made two cuts, one on the first and the other on the second lip, 2 cm away from the tail we made a straight line in which I drilled eight holes. Now going to its mouth, on each rib side of its width two were drilled.

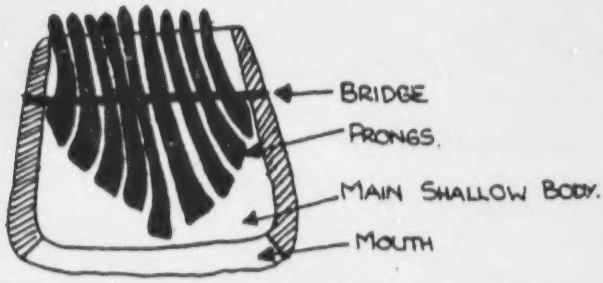
How we made the Prongs

We found a long wire bar, and from it we cut eleven pieces and, we prepared the coal which was obtained from the local mulombwa dried wood. I then put the pieces of wires on the fire, and using the hammer we flattened the wires when they are red hot. At its back under the eight drilled holes a piece of flattened iron is laid, this iron sheet has also eight holes. Each hole drilled in the straight line of the wood must be corresponding to those of the flattened iron. We managed not to have any obstacle in these corresponding holes. A piece of wood also flattened is laid a few millimetres from the hole lines, and then a bridge is deepened in the two cuts, lying across the instrument body, then steadily eleven prongs were laid on the bridge and was separated by leaving a gap in the middle, having five prongs on one side and six on the other side. The purpose of the hole is to act as a sound box. Across the prongs, on the line of holes, a piece of iron was laid on top of the prongs which had overlapped the thin end of the instrument flattened at these ends. A piece of wire was used to attach the piece of iron at the back.

We then started wiring from the top to bottom. Wiring is a zig-zag order tying everything, the piece of iron and the flattened area near the bottom.

The prongs were all right but remained flexible a little. Prongs were laid in such a way that they don't touch or lie on the instrument body because they can't vibrate. Pitches of a note are according to the prongs, the shortest produce the highest pitch of a note in this case a tenor which is produced. Those bigger ones produce the lowest pitch and are the bases. If I want to tune or change the pitch, the prong is to be pushed inside.

Diagram of the Finished Instrument




How is sound produced

Sound is the result of moving matter, it is produced due to the vibration of prongs at a fixed point. Vibration means the to and fro movement of something. If there is movement but no vibration there can be no sound. Sound always presumes that something has caused vibration. These vibrations are transmitted to our ears, through air or solids, this seems to indicate that our ears connect near sound which have low vibrators. Prongs also have got a certain number of vibrations per second.

The Pitch or a Note

By pitch we mean the highness or the lowness of a sound, the pitch of any sound will depend on the number of vibrations per second. The pitch of a prong will depend upon its tension. Big prongs have got a high pitch of a note. The pitch of a prong will depend on the size of the prong.

Sound cannot travel in a vacuum so it needs a medium to travel in. Mubombwa for example found almost everywhere in Zambia is a good conductor of sound. There are many kinds of sounds, some are made by weak vibrations, high sounds are made by fast vibrations, that is why they produce the highest sound so far.

Bibliography

I got the ideas from Mr. Landeni a blind man from my village. He told me how to carve carefully. He also instructed me how to lay the prongs. Some scientific notes were applied from a science lecture on sound in a science class.

Members

1. Samuel Chanda
2. Evarist Mumbi
3. Stanislas Musonda

## INSTRUMENT TO PRODUCE SOUND

## THE SEKESE

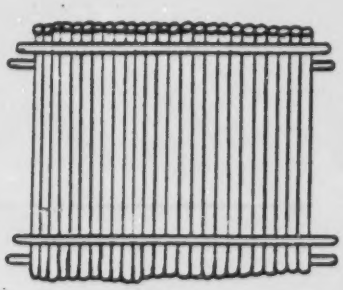
We have observed that sound is made by the vibration of a rod or column of air, also that the sound made by the vibrating body, varies with the length that is vibrating.

We have studied the height of a sound which is called the pitch. This pitch depends on a note, a note which has a high sound is said to be high-pitched and a note with a low sound, is said to be low-pitched.

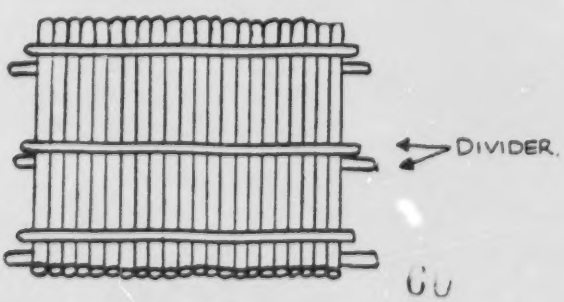
We have seen many musical instruments which are available in our daily life, such as a drum, Zylophone or a guitar, but here we are going to take an instrument which is called the Sekese, this instument was liked by many old and young people, and because of its sound which it makes, was given this funny name. It has no other special name apart from the Sekese.

We have also noticed that, matter is made up of extremely small particles called molecules. In order to understand how sound can travel from one place to another, we are going to make this instrument which we have mentioned above.

The first thing to be done is to collect long pieces of bamboo, then we choose among those pieces four long ones which could be placed sideways the bamboo pieces. This is done this way.

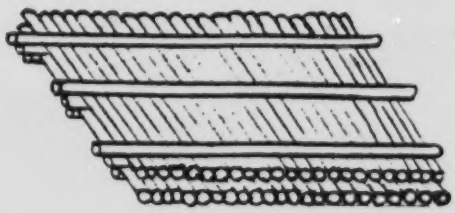


Then we take a thin string about 10 yards long and we cut it into two halves (5 yard each). Then, this string is being fixed to the bamboo pieces which we have arranged already. This is done in this way.



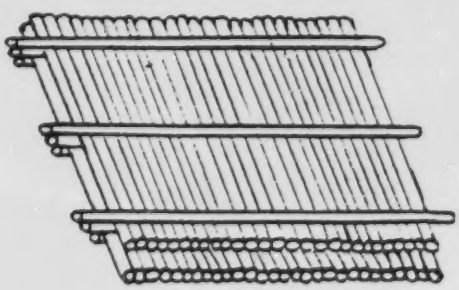
After finishing this again, there is something new to be made, this thing is called the divider. This divider is placed or fixed between the two longer pieces of bamboo it is made by getting two longer pieces of bamboo and you fix them just the same as you have done the other ones, these two pieces are placed between the middle one down and the other one up of the instrument.

After doing this we again have to make the second part. To make the second part is just to do the same as we have done the other one, these two parts have to contain the same measurements. After we have done all this we just have to take these two parts and fix them together in this way: and then we got to start fixing them with string.



Now what is left is to make shutters, these shutters are used for clothing and four holes which had been left opened during the fixing time of these two parts. These shutters are constructed in this way.

They are to have the same size and width. After we have finished making them, we then take the first two and close the other side of the instrument, then the other side with two sides is left without being closed.

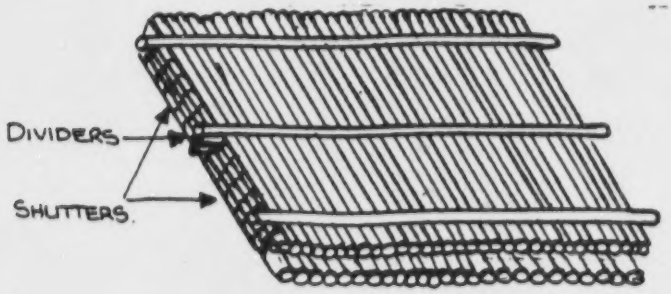


Now we take seeds of beans and maize. The beans should be put to the one side, and maize to the other. These holes must not be completely filled with beans or maize. This is due to the fact that the sound might not be heard very much, so we just have to fill these holes half way that each should

only contain half of beans or maize.

We have also observed that the sound made the vibrating body, varies with the length that is vibrating, so inside the instrument there should be enough room for the beans and maize to be moved about.

Then the last stage is to close the two holes which had been left out with the last two shutters so that it now looks in this way:




and then now we are able to play it and we can also be able to see the side which is having or producing the highest pitch. This is because we have seen already that the sound made by the vibrating body varies with the length that is vibrating. When we had been putting the beans and maize in the instrument, we had counted them that they didn't have different rates of numbers, but when we came to play it we heard different sound, the beans had a higher pitch than the maize and this has given us the fact that beans are not as big as maize, thus, inside the instrument to where beans had been put, there is much more space than to where the maize is.

This shows us that the sound made by the vibrating body varies with the length that is vibrating.

By - Boniface Chamba.

# DRUM MAKING

## AIM

The was to know:

(a) How to make the drum

(b) How it works

(c) How it is connected with Science, and how science can help us in making a drum.

## MATERIAL USED

(a) Tree trunk

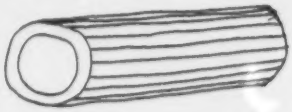
(b) Hammer

(c) Axe

(d) Chisel

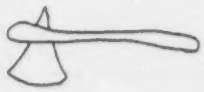
We cut the tree trunk with an axe and we put in water for several days, not to get cracks. Then we started to dig the hole with the chisel and with the axe. We were using the hammer to hit the chisel over its top end.

The length of the log which was cut was not more than half a metre.



TREE TRUNK.

We started drilling the hole through it, starting from one end of the log. At the beginning of drilling the hole through it, we used an axe.



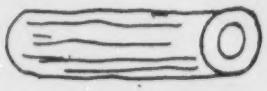
AXE.

When the hole came to be difficult to be made with an axe we took a chisel and a hammer.

CHISEL.

The chisel was to be stood on the log direct to its sharp end on the log and un-sharpened side was hammered with the hammer. Thus breaking our small pieces of wood.

After drilling the hole through the log, we took an animal skin and put it under water to make it soft. It was kept in water for two days. From the animal skin we cut two circular pieces of the skins. One had to cover each hole of the trunk dug. Then, we made strips from the skins which were penetrated through the small holes of the opposite hides.



SHAVED AREA.

## DESCRIPTION - HOW THE DRUM WORKS

When you have made the drum, and you want to play it, the first thing you will hear is the sound.

What is sound? It is audible air vibration, impressed by it on the sense of hearing, variety of this associated with any particualr source. If you had a drum with a very high pitched note but you wanted to play it in the low pitch. What can you do? I can put it in the shade so that it can loose its tension, and it can come to the low tension. You need the type of pitch you need to have low pitch or high pitch.

### Low Pitch

It is when the skin of a drum is contracted or when you put it in the shade the skin contracts, and the air in the sound box is contracted. So, when you are playing it, it could sound in a low sound. So, there are a small compression of sound and more friction, because it has contracted.

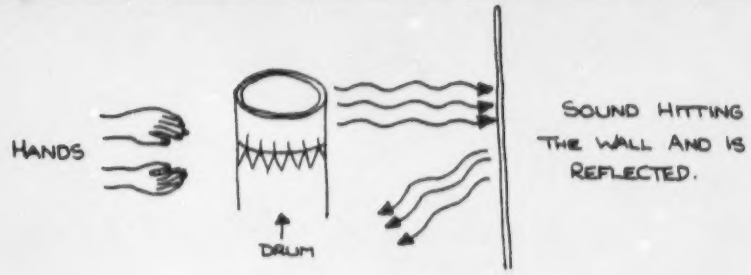
### High Pitch

We have already known that when gas, and solid is heated it expands. So, when the hides are heated on both sides, they expanded and the air inside the sound box expands. The collision of the air molecules against the walls and the hides cause them to expand. Thus, producing high pitch.

And we have already known that sound is produced by vibration. In this case of a drum, sound is produced by beating the drum with our hands which makes the hides of a drum go up and down (vibrate). The sound produced by a beaten drum can be heard as far as ten kilometeres.

### How Far can a Drum be Heard?

To know this first, it is to know the waves of how fast could it be heard or how slower.




We should know the waves of it. For example for the wave as you are walking, you are making a wave. This type of wave is called wave-motion. Another type of wave of motion is illustrated by the walking movements of millipedes. These "to and fro" waves, sometimes called push waves or longitudinal wave, are very much like the alternate waves of compression and refroction, in the air. Travelling towards all directions from the source of a sound. So, these waves could help us to hear the sound made by a drum if you are far away by two types of notes.

(i) Musical note

(ii) Noises

The sound always passes through the water and air. You can hear that this type of sound for the guitar and drum by the different pitches loudness and quality. We have seen that the pitch of a note depends only on the number of vibrations per second.

Can a Sound of a Drum Travel in Three States of Matter

Yes it can. It can pass through air, water and solid but in the vacuum it can not pass. Even as when you are playing a guitar, it vibrates. The vibrations of the strings make sound, and sound becomes louder ; the guitar is usually made from wood. The beating of a drum can be compared to the vibrated strings of a guitar. And the sound produced by beating of the drum becomes louder and deep voiced, by the hole which is inside the drum which also acts as a sound box. A light of the sun is reflected from shiny surfaces, so does the sound of a drum. But the sound of a drum is either reflected for shiny and rough surfaces, and the echo is heard. If the pitch is high the sound goes a very long distance.

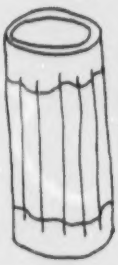
Thus, being reflected from one wall to the other. This continuous reflection of sound is called "echo". So, if the strings of the guitar are on the low tension, there will be low vibration, and there will be a low. In comparison with the drum, the pitch of the strings of the guitar depend on three factors.

(1) The length of the strings. From the drum the biggest produces a low sound.

(2) The tension of the strings; the drum to produce a high pitch needs to be of hard expanded skins.

(3) The weight per unit length of the strings, so needed for the drum to be.

A DRUM WHICH HAS A LOW TENSION. IT DOESN'T PRODUCE A HIGH PITCH BECAUSE THE SKIN IS NOT EXPANDED.



A DRUM WHICH HAS A HIGH TENSION BY WARMING IT WITH FIRE. PUTTING IT IN THE SUN IT CAN PRODUCE A HIGH PITCH.

Drums A and B have different tensions, drum B has a high tension by warming it with fire or sun and can produce a high note. Whereas drum A produces a lower note because the skin is not tightly expanded to produce a high pitch.

How did early men recognise the different sounds of a guitar, drum or the whistle (flute) which in Bemba is called "Ulusombo". It was the early inventors who discovered them.

Furthermore, we can try to come to the point of the drum, as we have said on the tension and sounds of the drum. We can go back and talk about vibration and tension. Without the tension of the drum or vibration, no sound can be heard. So, the tension and vibration are important things which can let you hear the sound. But if the tension is low, it can produce a low note.

The drum to work should have **essential** things. Skin, a trunk with a hole through it, which acts as sound box. Even the guitar should have the sound box and strings for the sound to be heard clearly. So these things mentioned above are the essential things needed to produce sound. If you don't have these, don't expect to hear any sound. Sound depends on what particular thing you are dealing with. Even the dry trunk can help to produce sound if it vibrates. A drum is an instrument which can produce any sound you feel like playing.

CONCLUSION

We've so far talked about the vibration and tension of the drum as the essential things which let the sound to be produced. Drums, guitars and all

muscial instruments need tension, vibration, and by having a voice, it depends (drum) on the thickness of the hides, strings, and size of the sound box, the same thing applies if the guitar has big strings, but can have low sound; the same thing applies to the drum if it has thick hides. The drum is used in traditional dances and calling people to funeral places.

BIBLIOGRAPHY

The old men who lived in rural areas taught us how to make a drum and how the drum is useful to the people.

MEMBERS

Nondo Matthias and Mwansa Venarcuous.

## TRADITIONAL HOUSE

It started mainly among the African people to make life well. They invented this kind of house and it really made their life easier in the way they were living.

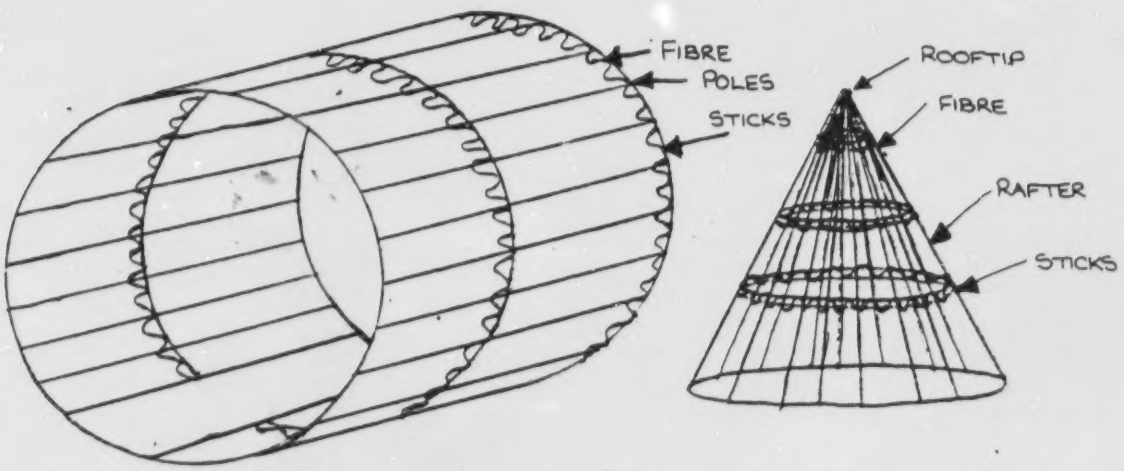
### Materials

An axe, a hoe, grass - especially finger grass, fibres, rafters, poles and little sticks.

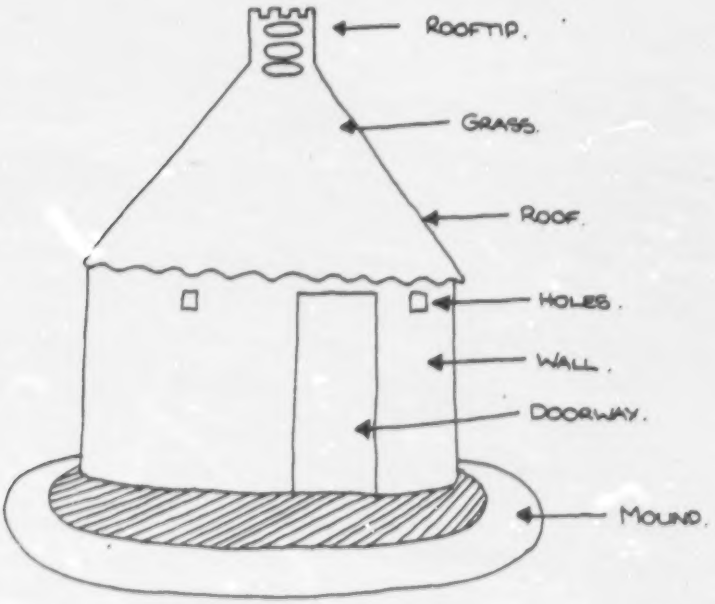
### Method

The people of long ago, they were building a traditional house in the form of a cylinder but not high and small, but this time some are building them in the form of a square. Maybe they have copied from the white men who built their houses in bricks in a form of a square.

The first thing needed to start a traditional house is to collect the fibres, poles, rafters, little sticks and finger grass. After that, you can choose a suitable place and make a big mound where a house could stand. It can be at least 50 cm high and you can mark around on it smoothly where you can stand the poles. And now you can tie the poles with small sticks, this makes the house strong especially the wall. The poles of the house should come from hard trees like Mubanga, Ndale, Kaime etc to resist the Ants and pests which penetrate into them. The little sticks also must come from stiff trees which can easily bend when we are tying them together with the poles and the rafters. The roof of the house is made up of rafters and little sticks. The rafters are sharpened at the big end, and when we are making the roof these sharpened ends meet togehter at the roof-tip and we tie them with small sticks to make the roof strong. The traditional house looks like this before it is thatched and covered with mud.



When you have covered the pole with mud now it called a wall. The roof is thatched with special grass called finger grass which prevents water of the rain to enter in the house. In addition to this, the roof being made in the form of one isoceles triangle it prevents rain water from entering in the house through the roof. After these, the complete traditional house will be able to look like the following diagram.




The floor of the traditional house is levelled with the soil from the anthills and this must be painted with white and black soil. The door of the traditional house made up of grass or seeds. It is the last thing to be made. It is used to cover on the doorway which has got two door posts especially at night to prevent cold and harmful things from entering the house.

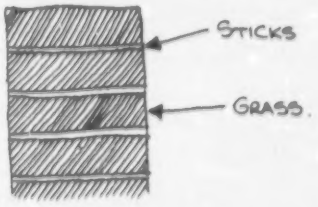



Diagram of the door. The door is made of reeds is stronger than the one made of grass.

Holes

The holes in the traditional house are for ventilation to purify the air inside the house. Ventilation can be natural or artificial. Artificial

ventilation is used by bars, stores, hospitals, hotels, but in the traditional house, it is natural ventilation which occurs.

Purpose of Ventilation

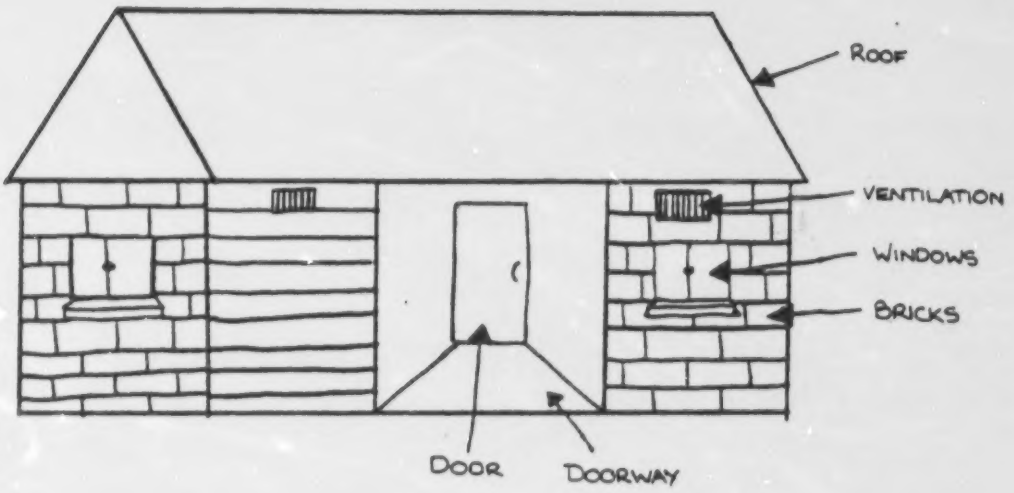
(a) To remove the waste products burning and breathing from the house and be replaced by pure air.
(b) When the gas is heated it expands so hot air rises up and cool from the outside comes and replace hot air in the house. The air we breathe out is dirty and far lighter than pure air because it is warm. The dirty air in the room rises up and finds its own way through the holes on the wall and cool air comes in.

If we compare a traditional house to a modern house, there is a big contrast. The traditional house can have one or two small rooms, whereas a modern house can have many rooms and the formation is very different. The traditional house is thatched with grass while the modern house is covered with iron or asbestos and the wall is made of bricks or rocks, while to the traditional house it is mud and poles. The rooms of the modern house can be supplied with window panes for ventilation sometimes, it is artificial ventilation by using electric fans. The air may be forced into the room and bad air sucked out of the room through the tubes near the roof. Modern house can be painted with paint and lime and also a traditional house, but after they use white or black soil.

A modern house is very important in this country. It can be built in bricks or rocks, the materials which are required are mould, window panes, glasses, paint, lime, iron or asbestos anc capital.

Method

The very first thing to start is to make bricks, you burn them to make them strong. The next thing is to choose a suitable place where to build it, and make foundation at least 50 cm deep then you can start building. After finishing, you plaster it with cement and paint it with lime and paint. The roof is hammered with iron nails to make it strong. The door is made up of planks and windows all left on the wall.




Advantages of Modern House

1. It is strong
2. It can last long
3. Doesn't easily damage
4. It looks more attractive than a traditional house
5. Modern houses are bigger.

Disadvatages

a) Too expensive
b) It is difficult to build
c) It is hot inside especially the iron type

Advantages of Traditional House

1. Easy to build
2. Not expensive
3. It is cool inside

Disadvatages

a) It doesn't last long
b) It is small
c) Dusty inside
d) It can be easily damged by rain, ants, fire.

Traditional House (Imitanda)

It is mainly built by those people who migrate in the bush to be near their farms in various times e.g: harvesting, growing crops. They do this to reduce the distance from their villages to the fields.

Materials

Grass, poles, rafters, fibres.

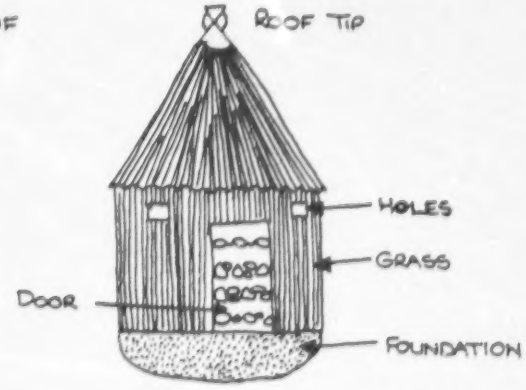
Method

Imitanda is the most primitive jerry built house. We can call Mitanda as the house made of grass because it is what it is like when it is finished.

The very first thing is to collect the material we have mentioned in the last notes. After you have gathered these, you can make a foundation at least 20 cm deep and you stand the poles in it and tie them with little sticks to make it strong. After that you can cover it with grass and bury the foundation with the soil. The formation of the roof of mitanda is made in the same way like the traditional house, and also the roof.

Imitanda is dangerous at night and in the day time because snakes can penetrate in the grass and enter the house. In addition to this,dangerous animals can enter the house by breaking mutanda. In the doorway of imitanda there are two strong door posts they are used to close the door, the floor of mitanda house is cleaned with a hoe.

DIAGRAM OF MUTANDA




VENTILATION IN THE MUTANDA OCCURS NOT ONLY THROUGH THE HOLES, BUT ALSO THROUGH THE GRASS WALLS AND ROOF.

The door of imitanda is the same as in the traditional house. It is made of grass, reeds and little sticks. When one compares mitanda to the traditional house and modern house, we find that mitanda is a jerry built house, and the more primitive of the two.

Advantages of Mitanda

(a) It is easy to build and it doesn't require too much enegy.
(b) It can be built in a short time.
(c) People doesn't go a long distance to work in their fields.
(d) It is not expensive.

Disadvatages

(a) It can be easily damaged by fire, rain.
(b) Snakes can enter the mutanda throughthe grass.
(c) It is not defensive.
(d) It is small.
(e) It doesn't last long. It is only used for a few months.

Mumbi Partrick and Mwansa Lanes. Bibliography - None

# AFRICAN MEDICINE

## Introduction

To those who don't know how various trees are called in Bemba, we have prepared a list for some of the trees how they are called in English or in scientific names. We have been helped to find how they are called by a Bemba/English text book.

Most of the information in this project, is from the elders. There are also some trees at the last pages which are mostly used in preparation of traditional medicines.

We should have written a lot of medicines but they are too complicated at least some medicine explanation can take two or three pages; as you know African medicines are too complicated to use.

## Discovery and Use

The greatest thing for human being to be always happy is to be in good health. But we all know very well that sometimes our health is affected by something that makes our bodies feel bad. The question is why is it so? This is simply because there are times when we feel sick or we are ill. It is also well known to everybody that some various diseases cause our life to end in other words they lead us to death. How do we save ourselves from this danger? That is why there is what we call "Medicine".

We should like also to know that there are various diseases of which some are very serious and require strong medicine and some which can be cured easily. But some diseases can go out without applying any herbs and some can't like these ones, leprosy, small-pox , malaria and like venereal diseases for instance "syphilis" and others. These kinds of diseases need strong medicines to deal with them, to cure them.

## Explanation of Discovery of Medicine

But how had all these medicines been discovered by man? The answer is not all that simple to give or explain as people say it in many ways. The explanation we are going to encounter may be the correct one. Let us first for a short while think about how ancient people had started to cure themselves and how they discovered their remedy. Through oral tradition we have heard from elders that medicine resulted from many ways some were successful and some not.

Some medicines according to what is said were discovered by visions (dreams) during night. That is why it is still happens so that you can dream

someone showing you something strange especially medicine. Some herbs were discovered by contact. By this I mean let say you have a pain in your eyes, you happen to pass under a tree or near by which has gor some kind of liquid and all of a sudden liquid fall into your eyes. That day or at that particular time you feel better. So people saw was another way in which they discovered their medicines. But bear in mind that a lot of these kinds of medicines discovered in these ways were not very many and popular. Why? In case they killed many people some were left blind, just the majority.

It has also been said that during the famine a lot of peole were dying. Why was it so? It is simply because whenever they tried to dig up some root-food, some roots were too dangerous and others were not, as they are still now. People were dying like animals and it was from this process that man discovered some root-trees and plant-leaves which were poisonous. In this way not only medicine had been discovered but also the way in which certain types of root-food were discovered.

Wrong Application of Medicine

But in accordance with the use of their medicines we can see and we have been told that there were no good ways or methods of giving someone the medicine according to the medicine needed. It is because the amount of medicine supplied sometimes did a little bit of good, and sometimes not. This means that they could take the herb to give somebody without knowing how much they should give him. That is why deaths were much more because of wrong giving of medicine. As a matter of fact it showed them as if medicine had little use to them. This is still happening to our people in villages.

Why should African Medicine not Develop?

A lot of people say our medicine will soon disappear, why? It is because the people having these medicines don't give or show them to others unless they are paid. So whoever having not these medicines has to buy for himself or herself. So when these people who know medicine die, it will also be the die-away of their medicine as long as nobody knows them. This is quite true. As the saying goes in Bemba "Ingranda Ishikuka Ilo fwo" which means we young people have to know things we don't know from our parents while they are still alive, so as to be the future users. If you leave you parents' home for another place where no relatives are available and unfortunately you become ill what can you do? Had you known such things before you wouldn't have been in so much a danger. So let us have these in advance, so as to overcome any problem facing us in future. But witch doctors need to be paid as they also paid for them in some ways or others.

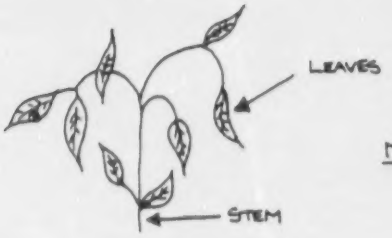
But bear in mind that it is very dangerous to give someone medicine without any proof of it or without knowing how it is applied. In this case lots of people bring misery. Let us not be blind about this.

How some Medicines are Applied

Those who don't know how certain types of trees are called, in Bemba is a list at the back as you are already told at the beginning.

Vomiting (Umuluko)

Find where a small mutungulu is, dig some of its roots and soak them in a cup or bowl of water then swallow the sap when it has become a little bit bitter.

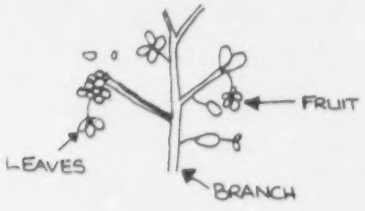



MUTUNGULU.

This plant bears a kind of brown fruits when they are unripe, and when ripe red. It can be found in most of the places in Zambia especially in chipya areas. Its fruits are half in the ground and half outside near the stem.

Diarrhoea

Take some bark of Mupundu tree, soak them in a cup or bowl of water until the water becomes a little bit red then drink the sap. This is mostly used for young children and even elders.




MUPUNDU.

This tree is very important and useful of its fruits. Its fruits are used for making a kind of juice which is mostly used to make porridge. Its fruits are green when unripe, when ripe yellow.

Diarrhoea

Take some of mulombwas bark soak them in a cup or water then drink the sap when it is red. This medicine when dissolved in water it is very bitter.

MULOMBWA

This tree is very important for all kinds of carpentry. It is a little bit hard and brownish in colour when planted it looks very nice.

Stomach trouble

Take some of mushisha leaves with your mouth while you eyes are closed. Chew them and swallow the sap, the sap is a little bit bitter. When chewed the leaves are completely green with a black trunk. Sometimes it bears fruits which are very small.

MUSHISHA

Headache

Take some of Chibangalumes roots dry them, then grind them and make tattoo marks around you head. This plant can be found anywhere but it is very difficult to draw it.

Vomiting

Dig some of mumfwemfwe roots, soak them in a cup of water and then drink the sap. This plant is very small and most of the time it is found with white flowers. The flowers are always at the ends.

Toothache

Take some mufungo leaves chew them and then swallow the sap. This tree bears green fruits when unripe and black when ripe. It can be found nearly in all places in Zambia.

See on the next page where some of the trees which are very important are drawn and written.

This is just to help others understand the project well.

| Bemba | | Scientific Names |
|---|---|---|
| Kaimbi | ..... | Erythrophleum |
| Mululu | ..... | |
| Mofu | ..... | Entadrophragma delevayi Guerte |
| Mulombwa | ..... | Pterocarpus angclensis D. Loud |
| Mupapa | ..... | Atzelia quanzensis Welio |
| Mupundu | ..... | Parinarium Mobola Oliv |
| Janigo | ..... | Faurea specioso Welio |
| Mubanga | ..... | Atromosia angolensis |
| Cipamba | ..... | Monotes oblongitolius Hutch |
| Lwumba | ..... | Syzygium |
| Mucerja | ..... | Diospyros |
| Mukuwe | ..... | Hirtello bangweolensis |
| Museshi | ..... | Manguesia macroura Gila |
| Mwengele | ..... | Xylopiya |
| Musase | ..... | Albizzia sericocephola Benth |
| Mulobo | ..... | Berlinia crabiano Bat. F. |
| Mulunguti | ..... | Erythrina abyssinica Lam |
| Ndale | ..... | Swortzia Madagascarensis |
| Kalongwe | ..... | Dalbergia nitidulo Welio |
| Mutondo | ..... | Brachystegio altenii Burt Davy |
| Mpuso | ..... | |
| Ciya | ..... | |
| Muombo | ..... | Brachystegio longifelia |
| Ngalau | ..... | " taxfolio haims |
| Mushike | ..... | " microphylla haims |
| Muputu | ..... | " speciformis Bentls |

Very difficult to find the rest of the missing spaces.
These are the most important trees named above.

By - W. Mulengo, S. Fedilis, G. Mulengo.

STEM WITH LEAVES, FLOWERS AND FRUIT.

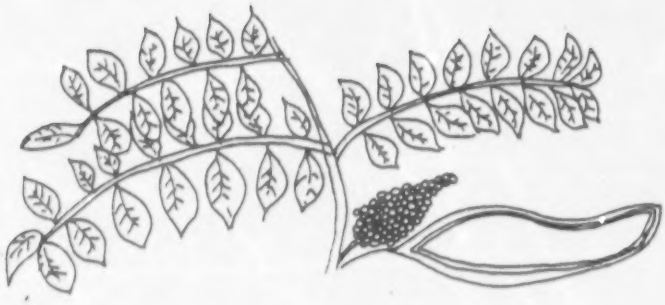
Musompa

Is a small tree found in Northern areas of Zambia. It is used for mining charcoal and firewood. Stem with leaves, flowers and pods.

FLOWERS, SEEDS AND LEAVES.

Mululu

Evergreen tree found along river banks in the Norhtern and Central parts of Zambia. The bark and roots are used in traditional medicines.

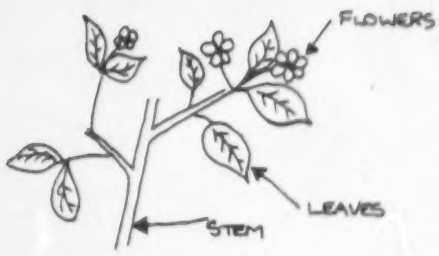


Kaimbi

Found in the Chipya woodland on lake basin soil. The bark and roots are used for traditionalmedicines

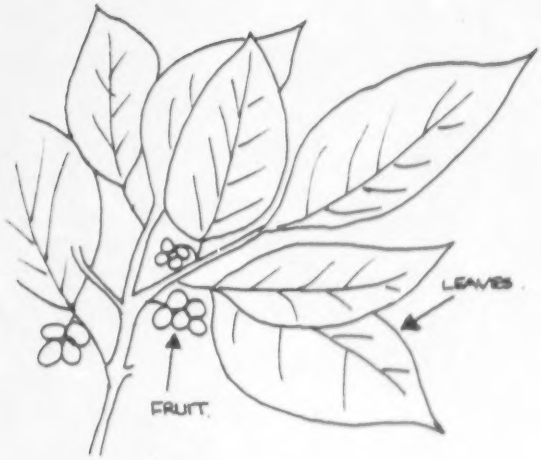
Mukwa

Flowers and leaves. Found in the Chipya woodland areas. It is the chief furnitue wood in Zambia. The sap from the bark is used as fish poison and the roots, sap and bark are used in preparation of traditional medicines.



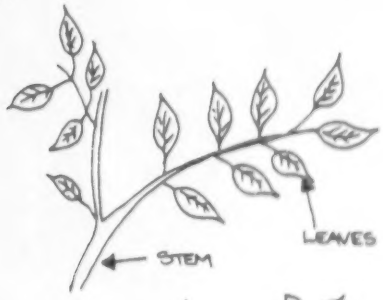

Mukuwe

It is very much used for house poles or rafter and for charcoal.



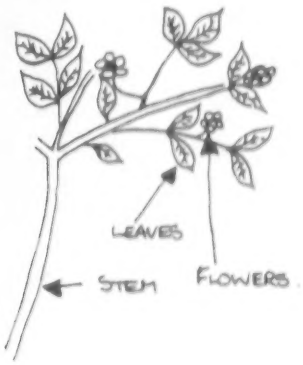

Musuku

Very small tree and every year bears fruits which are very much eaten by Africans. Its leaves are very large. This tree is found in Chikokola woodland areas.



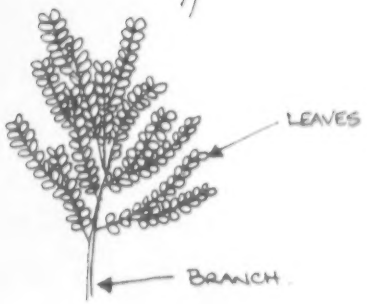

Mucenja

Is very small and always found on top of anthills. It is very much used for cleanign the teeth.



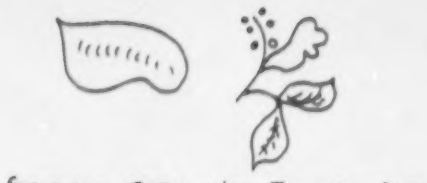

Janinga

This tree can be found in most of the places in Zambia. It is very much used for roofing.




Ngalau

It can be found in most of the places in Zambia. It is very much used for many works especially for house building in villages.



SEED POD, STEM, WITH FLOWERS AND LEAVES.

Mupapa

The bark and roots are used in preparation of tradtitional medicines.

SEEDPOD, FLOWERS AND LEAVES.

Muwaka

The pods are ground up into a paste and used as a poison to stun fish.

ZAMBIAN TEAK.

Mukusi

Timber reddish-brown, heavy and fine textured.

Mubanga

The chief carving wood o Zambia, is very hard and heavy. Bark and roots are also used in the preparation of traditional medicines.